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ANNUAL REPORT
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CONTENTS

PART I.—AGRICULTURE IN 1958

	Page
Review of the Year	1
Weather	9
Food Production in African Areas	11
Agricultural Exports in 1958	11
Crops	11
Livestock Products	18

PART II.—RESEARCH AND SPECIALIST SERVICES

General Husbandry	23
Animal Husbandry	26
Grassland	27
Coffee	29
Pyrethrum	33
Sisal	33
Sugar	33
Horticulture	34
Plant Pathology	35
Entomology	35
Soil and Agricultural Chemistry	36
Plant Breeding	38
Irrigation	39
Agricultural Machinery Testing	39

PART III.—FIELD SERVICES

Progress in Improved Farming—	
European Areas	41
Asian Areas	41
African Areas	41
Reconditioning, Resettlement and Development Schemes	43

CONTENTS—(*Contd.*)

	PAGE
Soil and Water Conservation	44
Soil Conservation—European Areas	45
Soil Conservation—African Areas	46
Water Conservation—Mechanical Dam Construction Units	47
Water Supplies—African Areas	48
Field Drainage	48
Irrigation	48
Agricultural Education	52
Marketing—	
Produce Marketing and Inspection	53
Co-operation	54
Grading and Inspection Services—Mombasa	54
Bird Control (Quelea)	56

PART IV.—GENERAL

Library	57
Publications	57
Agricultural Legislation	61
Staff	62

TABLES

A.—Some Figures of Rainfall over the Main Agricultural Areas of Kenya, 1958	10
B.—Particulars of Coffee Production—African Areas	14
C.—Quantities and Values of Exports of Kenya Products, 1958	19
D.—Quantities and Values of More Important Products Marketed from the African Areas	21
E.—Soil Conservation—European Areas	46

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PART I—AGRICULTURE IN 1958

Review of the Year

The year 1958 has seen a shake down in a number of Kenya's agricultural industries arising from a decline in world prices of many agricultural commodities, from more highly competitive conditions on world markets and from the output in Kenya of a number of products progressively exceeding the absorptive capacity of local markets. Kenya has been a world trader for the bulk of its production of coffee, tea, sisal, wattle, pyrethrum and cotton for several decades. The products of mixed farming, butter, bacon, maize, wool (and meat in certain circumstances), which have been sold abroad on a moderate scale in the past, are now entering world competition more strongly as farming productivity mounts and exceeds the capacity of local and neighbouring markets. Every signpost points to expanding production, to a battle for markets and to the need for a degree of efficiency in farming which will continue to yield profits from competitive world prices.

Land Management and Productivty Trends

The omens which are noted in this report are based on the rapid progress which is being made with farm planning in the European Highlands (in 1958 57,281 acres were planned, 212,266 acres since 1951 and an annual target of 100,000 acres is set for future planning), on the increasing use of irrigation by the Asian sugar farmers of Nyanza, by European coffee growers and by Africans elsewhere, and on the advance in land consolidation and enclosure and planned farming in the African land units. In the Central Province by the end of 1958 fragments had been gathered on 999,397 acres and 779,547 acres had been demarcated on the ground as individual holdings, while farm plans and farm layouts covered 41,799 acres. In Nyanza farm planning and farm layouts were extended to a further 62,000 acres. In Elgeyo District skeletal conservation layouts have been applied to 34,000 acres and development work was started on another 50,000 acres. In other African districts of Rift Valley Province progress is being made in the high areas along the same lines and by developing water supplies, while in the dry lowlands 388,000 acres have been brought under grazing management in West Suk and Baringo Districts. Progress in Ukambani since 1951 has been impressive in the fields of soil conservation, grazing management, livestock control, provision of water supplies, afforestation, bush control and self-help.

In African areas particular attention has been given to the simple basic practices which are fundamental to productivity, and some of which have been overlooked in recent years in the urge to plan and develop; timely preparation of land, manure making, placement manuring, row planting, timely weeding, which make so much difference between crop success and crop failure.

A significant step in the contribution to sound land use in Kenya was the publication of the Report of the Working Party on African Land Tenure, 1957/58, with its appended draft legislation. The structure of consolidated holdings is being built up by the efforts of the administration and the agriculturists. If the African in Kenya is to advance from a subsistence to a viable economy, if every acre in Kenya is to contribute to the national wealth and is not to be a drain upon it,

then it is of crucial importance to create conditions where the aggregation of uneconomic holdings into minimum economic units is encouraged and fostered and where sub-division of holdings below the economic level cannot occur. A return to subsistence farming would be disastrous for Kenya. Wisely implemented, the Report of the Working Party can provide the foundation of the wealth which is so urgently needed from the African districts of Kenya and towards which good progress has been made in 1958.

The conclusion to be drawn from these many developments in 1958 is that the farmer, European, African and Asian, is giving increasing and much closer attention to the productivity of his land and this in its turn will create surpluses of production of a wide range of crops and products which will have to rely on entry to world markets for their disposal. The events of 1958 stressed the need for high yields, good quality, low production costs and efficient and energetic marketing organizations. How intermixed are the affairs of mixed farming in Kenya can be gleaned from the record of the component industries in 1958.

The Mixed Farming Enterprises

The dairy industry, along with New Zealand, was hard hit in 1958 by the glut of butter put onto the London market in the first half of the year, the Kenya surplus being aggravated at that time by good rains and good grazing. Effective action was taken to meet the situation, in the United Kingdom by the representations of New Zealand and by import licensing and negotiation with the countries responsible for dumping, in Kenya by successively dropping the price of butterfat to farmers from Sh. 2/90 per lb. to Sh. 2/50 and Sh. 2/30, milk dropping to Sh. 2/10 per gallon; by Government backing of limited overdrafts and by the introduction of the Dairy Industry Ordinance and the establishment of the Dairy Industry Board. Whatever market hazards lie ahead, the dairy industry was enabled to dispose successfully of a production which in terms of butterfat equivalent may have amounted to 18,000,000 lb., locally and on external markets, compared with the production which had been estimated for 1958 by the Dairy Report of 15,250,000 lb. Higher production has therefore offset lower prices. Production will continue to rise and market search, internal and external, is the order of the day.

At a time when the new Uplands Bacon Factory was nearing completion, the pig industry was severely hit by export market losses, due to a fall in the London prices caused by excessive supplies from certain European countries, to refrigeration difficulties and to a London dock strike. The application of substantial and increasing export equalization cesses failed to match the situation. Drastic action taken by the industry and Government in the latter half of the year resulted in a thorough reorganization of the Uplands Bacon Factory Board and finance, in the resignation of the old and election of new producer members to the Pig Industry Board and in the replacement of the export equalization cess by production quotas. The Boards allocated a fixed price (Sh. 1/50 and Sh. 1/30 per lb., respectively) to 60 per cent of the production of Grade A Baconers and Porkers on a quota system to farmers equivalent to internal consumption requirements and undertaking to purchase the remainder of farmers' pig quota production at an agreed price structure less 50 per cent, profits to be operated as a pool. The installation of a new deep freeze at the Uplands Bacon Factory to get bacon onto ships cold enough to avoid deterioration has been accelerated and the new factory is planned to make much more efficient and attractive use of the pig by-products. What is now of concern to the mixed farmer is that the throughput of the new factory of around 2,000 pigs a week is not far off current production, and therefore if local consumption is expanded and the export market yields even a modest profit after disposal of past losses, expansion of the factory cannot be

far off. Pig production and disposal, as was shown in 1958, is a very essential and integrated part of the mixed farming economy, of significance to the Kenya cereal grower in diverting surpluses from world markets and to the dairy producer in utilizing skim milk, as well as in the annual national and farm production planning.

The maize industry ended the year with somewhat better prospects than it entered it. The Government Sessional Paper on the Maize Industry gave promise of a Maize Marketing Board to handle surplus production to the best advantage. When it embarked upon the annual price review for 1958, the industry had to consider the carry-over of a substantial export loss from the 1957 maize crop, a marked drop in consumption due to good seasons, and the continuing prospect of exporting a maize surplus from the 1958-planted crop. In the event, the 1958/59 maize crop was again a large one and out of some 1,800,000 bags, export sales for some 800,000 bags are having to be found. The maize producers shouldered heavy cesses on the 1958-planted crop to furbish the maize export fund account, the Scheduled Areas grower paying Sh. 10 per bag of production, the Non-Scheduled Areas Sh. 8. This led to a drop of 35,000 acres in the planted acreage in the Scheduled Areas. By this stern measure, by the efficient handling and the careful accounting of the Maize Controller and by prudent selling of six cargoes by the Maize Export Sales Committee, the maize industry was able to face 1959 plantings with the prospect of but a small deficit carry-over so that the resultant crop could be dealt with on its own merits. and with the possibility of averaging the internal price with receipts from external sales based on regional price pools.

The Maize Breeder at Kitale has developed the synthetic maize breeding programme to a stage where a line of hybrid maize breeding could be developed. He is also taking over the Brieger synthetic maize breeding programme developed by the East African Agriculture and Forestry Research Organization. The maize breeding programme is now ready for expansion in order to make its contribution to increased yields per acre and reduced per-bag costs of production or to releasing land for other productive activities. An application was made to the Colonial Development and Welfare (Research) Fund in 1958 for assistance with the maize breeding programme and it is hoped that the maize industry will also contribute in due course. Arrangements were made also for the Maize Breeder to undertake in 1959 an intensive study course on maize breeding in the United States under the International Co-operation Administration technical aid programme.

Wheat production at around 1,000,000 sacks, which was 30 per cent below East African consumption, continued at a depressed level because of the shortage of rust-resistant wheats of good baking quality. The experiment made in 1958 of paying a premium price, Sh. 58/50 per sack, for wheats of good baking quality, Sh. 53 per sack for medium wheats and Sh. 50 per sack for discount wheats succeeded in raising the area under premium wheats from 25,039 to 49,050 acres, but failed in its objective of raising the production of such wheats, premium wheats suffering worst from rust and averaging but 3.38 bags per acre as against 4.45 bags for medium and 4.79 for discount wheats. The area under wheat has dropped nearly 100,000 acres since 1955. It is now necessary to import some 400,000 sacks annually to meet the East African deficit and they can be in the form of hard wheats to improve the baking quality of flour. There remains the urgent need, in the interests of the mixed farmer and the national economy, to maintain wheat production at no less than its present level and, by breeding for rust-resistant hard wheats, to restore it gradually to its former level of production.

The Cereal Producers' (Scheduled Areas) Board contributes by means of a cess to the wheat breeding programme at the rate of £13,400 a year. This has enabled extra land to be acquired at Njoro, new plant breeding laboratories to be

built at Njoro, new breeding techniques and rust investigations to be developed and extra wheat breeding and plant pathology staff to be employed. A Colonial Development and Welfare (Research) Fund grant was sought to step up investigations into the epidemiology of black stem rust of wheat. Technical advice was given by Dr. G. D. H. Bell, Director of the Cambridge Plant Breeding Station, who visited Njoro in September, and has been sought from the Rockefeller Foundation which assists wheat research programmes internationally and financed a period of intense study by the Senior Plant Breeder of wheat breeding techniques in Mexico in 1957. Under the International Co-operation Administration technical aid programme, the Senior Wheat Breeder is to receive specialized training in the United States and Mexico in the summer of 1960.

This is a long-term process and in the meantime the swing into barley continued, the 1958 acreage of 63,761 comparing with 51,507 in the previous year and 21,700 in 1955. This emphasizes the need to expand the pig processing and malting industries if surplus cereal production is to be absorbed to the benefit of the mixed farmer.

Reorganization of the Kenya Meat Commission and a vigorous selling policy put the beef industry in a much stronger position in 1958 so that fears of glut have been turned into fears of shortage. In the highland areas sheep flocks have been building up under a stable internal market and good mutton and lamb prices. Saturation point cannot be far ahead and development of Kenya's big sheep potential will then depend upon a policy of vigorous market search. Farmers and the Sheep Committee of the Kenya National Farmers' Union took a much closer interest in sheep management during the year. Concurrently there is an increase in wool production and a need for greater attention to wool quality.

Intensive livestock management is becoming a feature of farming and there is a steady improvement in grassland management and a steady expansion in sown grass leys in all districts of the Scheduled Areas. This has been encouraged by means of short-term advances under the Guaranteed Minimum Returns. Experiments and investigations which are being carried out to help the mixed farmer, besides the important programmes of grassland research and plant breeding, included studies of spring calving to raise production and reduce costs, of imbalance of starch and protein in pasture grasses and the dry matter intake of the dairy cow, of early weaning and dry calf starter trials to save money, labour and management, of maize and skim milk pig feeding trials, of fecundity in sheep and of the use of cheap buildings and labour-saving systems. Trials of a range of alternative crops and crop varieties are being undertaken.

The work of the East African Tractor and Implement Testing Unit, based on Nakuru and financed in 1958 from Colonial Development and Welfare Funds, testing tractors and implements under East African conditions, and of the Bird Control Officer, following and destroying the flocks and breeding colonies of the Sudan Dioch (Quelea) into Tanganyika and the remoter areas of Kenya as well as in the grain-producing areas, provided services to the farmer of greater significance than their small size would suggest.

Under the auspices of the Egerton Agricultural College Economist and with the aid of a seconded departmental officer, an economic survey of 80 farms in four main producing areas between Nakuru and Mount Elgon was phased to bring in 20 Njoro farms in April, 20 in Trans Nzoia in October, 1958, 20 in Uasin Gishu in February, 1959, and 20 in Molo-Mau Narok in March, 1959. Farmers have co-operated most willingly. The results of these surveys should influence the methods and efficiency of farming materially and for this reason the Colonial Development and Welfare (Research) Fund has been asked to assist by meeting the cost of two further farm cost Economists, one for European areas,

one for African areas, the latter being the essential local next step to the investigation done by Dr. John Raeburn in 1958. At the date of writing tidings have been received to say that this has been agreed.

A Market Research Division was established in the Ministry of Agriculture, the post of Market Research Officer being filled, that of Market Liaison Officer being unfilled by the end of the year. The Division will be of great assistance in collecting market information and statistics and undertaking investigations although it will not relieve marketing organizations or commercial undertakings from their own responsibility of undertaking vigorous market promotion on behalf of farmers.

Cash Crops

Kenya's main export income comes from the sale of cash crops, coffee, tea, sisal, wattle, pyrethrum, pineapples and cotton providing three-quarters of the revenue. For the European producer, coffee, tea, sisal, wattle and pineapples are plantation crops and pyrethrum comes from the high-altitude mixed farms; for the African, while good cultural practices are observed, coffee, tea, wattle, pyrethrum, pineapples and cotton have not yet reached the stage of specialization but are grown as a facet of the mixed farming unit but an expanding one designed to build up the resources of the farm and to compete on the export market rather than to glut the local market.

Another good coffee crop was set in Kenya in 1958, which it is hoped will yield 22,521 tons, of which 3,287 tons will come from African growers. This compares with total crops of 18,472 tons in 1956/57 and 20,837 tons in 1957/58, with respective African production of 1,521 tons and 2,167 tons. The African crop, based on new plantings and programmes, will expand at a rather greater rate in the years to come and the very urgent need to expand the base of the African cash economy, if political stability and a worthwhile standard of living are to be obtained, must receive sympathetic consideration in any international negotiations to regulate coffee exports. International discussions in Paris and Washington in September, at which Kenya was represented, did not result in international agreement. Expansion of coffee consumption is a first essential and for this, closer study was needed of the effect of price reductions within the capacity of the industry to stand and of the removal of taxes and tariffs in consuming countries such as Germany, Austria, Italy and France. A study group was therefore set up for a further international conference in 1959. A good step forward in expanding coffee trade relations was the appointment of Sir Stuart Gillett as Public Relations Officer in London for the Kenya Coffee Industry.

Because of its high quality and special characteristics, Kenya coffee is readily saleable and top classifications command, and in 1958/59 still commanded, substantial premiums. A severe slide in coffee prices was expected, but in the event was less substantial than feared. 18,600 tons of current-season crop sold to the date of writing having averaged £402 per ton compared with £444 in 1957/58 and £528 in 1956/57. The rate of processing the coffee crop has been very creditable having regard to the fact that the Nairobi coffee mills were burnt down in November, leaving only one mill to deal with the large crop. The Kenya Planters' Co-operative Union is building a new mill to handle the full crop, but this was not due to be completed until 1960. It is hoped to get one of its milling units into operation for the 1959 season. The significance of producing good quality coffee, which depends both on cultural treatment and on processing, and which may mean a difference of £100 or more per ton, is such that in 1958 careful consideration was given to improving the supervision of plantations and factories in the African areas and to the contribution by Provincial Marketing Boards from cesses on the crop to increased instructional staff. While around 60 per cent of the

Meru and Embu crops normally fall in the first three classes, it has been possible to pull the quality of the Elgon Nyanza and Fort Hall crops up substantially.

Good progress was made in the study of the epidemiology of Coffee Berry Disease and its control at the infective stage, control being now possible at an economic level both east and west of Rift. Increasing attention is being given to controlling *Hemileia* Leaf Rust in coffee and to determining varieties resistant to the three races of rust known to occur in Kenya. Assistance for finance to continue the research on both diseases was sought from the Colonial Development and Welfare (Research) Fund while the Coffee Board of Kenya has continued to contribute substantially to this and to the coffee research expansion programme, including more staff for the main Coffee Research Station and the development of coffee sub-stations in Upper Kiambu and Nyanza. Government made good progress in developing the coffee sub-stations in Meru and Kisii. The Coffee Board of Kenya put up proposals for African representation at the Annual Coffee Conference and on the Coffee Board and Coffee Marketing Board and this awaits amending legislation.

The tea industry has continued to expand steadily, the planted area increasing by 2,300 acres to 32,200 acres out of a total of around 70,000 acres licensed for planting. There was no severe variation of prices during the year. The Tea Board of Kenya put up proposals for representation of Provincial African-grown Tea Marketing Boards on it and this now awaits legislative approval. Two significant developments in African tea growing took place in 1958. The tea plantings in Nyeri and Embu Districts serving the Ragati Factory on Mount Kenya went ahead and good quality tea was sold at good prices on the Nairobi tea auctions. It had always been recognized that, if Africans made a success of peasant tea growing, provision of finance for future and costly factories would be difficult. This was tackled in two ways. In areas where plantation factories existed close to African land units, a number of the leading tea companies in Kenya were approached and in 1958 they very generously agreed to purchase green leaf from African-grown tea for a period of years to a total of 3,350 acres in the districts of Kericho (900), Kisii Highlands (1,860), Nandi (500), North Nyanza (250) and Kiambu (200). This gesture allowed consideration to be given to seeking financial assistance for the erection of factories under a programme phased over 12 years in African areas suitable for tea distant from the existing tea areas from the Colonial Development Corporation and from tea and commercial companies. A number of projects are under investigation. Meanwhile, substantial tea nurseries were developed in Kisii, Kericho, Nandi and Central Province.

Tea research for East Africa, based on the Tea Research Institute, Kericho, is financed and run by the tea industry of the three East African territories. A new Institute is being completed on 400 acres of forest land at Timbilil, provided by Government in the Mau Forest above Kericho, which will give much better scope for experimentation. The Department continued its own tea experiments at Kagochi on Mount Kenya and began to draw up a programme of research to solve problems of peasant tea cultivation for integration with the Tea Research Institute programme.

Despite low prices, the output of Kenya sisal has expanded by 11,616 tons in the last four years, earning some 10 per cent of the value of agricultural exports. The small rise in the price of sisal which took place towards the end of the year, from £72 to £79 per ton for No. 1, was most welcome. Development of manufacturing uses of sisal at the Ruiru bag and cordage factory for bags, twine, rope and carpets has substantially helped to draw off lower grades of East African sisal, 4,182 tons being used in 1958, all but 800 tons being from Kenya estates. Replacement of jute imports by local production of soft fibres has not yet been

possible, but experiments with Kenaf (*Hibiscus cannabinus*) have made good progress and arrangements have been made to test a new Kenaf ribboner and a pineapple fibre extractor, in 1959. The production of 374 tons of *Phormium tenax* from Uasin Gishu was used at the bag factory. Sisal research, with the aid of the Sisal Research Advisory Committee, is gaining increasing support and for the second year running there was a record attendance of growers and the trade at the Planters' Day held at the High Level Sisal Research Station in December.

The pyrethrum industry, due to the effects of climate and of the Thrips pest, to the allocation of production quotas and to vigorous sales promotion moved from a position where a surplus of 1,300 tons of flowers or extract equivalent at the end of June, 1958, will be reduced to one of around 300 tons at June, 1959, or just the June production, a marginal stock reserve. African production continued to run well below the quotas allocated to districts and co-operative societies, in Central Province substantially due to the movement of holdings and replanting of pyrethrum brought about by land consolidation.

Wattle bark and cotton were sold at depressed prices, although the Cotton Lint and Seed Marketing Board has been able to maintain the cotton price assistance fund close to its initial level. The pineapple crop for canning continued its unpredictable career, although, now that a Canning Crops Board has been established, it is hoped that a regulated but steady expansion will be possible. While in 1954 there was pressure from canners to produce large quantities of pineapples and in 1956 there was criticism that Africans were being encouraged to grow too many, in 1958 canners had difficulty in finding enough to meet what they could sell. However, at the end of the year the export price position had again become precarious. A pineapple research station has been developed at Thika adjacent to the Sisal Research Station and the Canning Crops Board has, with the aid of a cess on pineapples and funds passed on by the former Thika Pineapple Growers' Association, undertaken to meet the cost of a Horticultural Research Officer, who has been recruited and is on the job.

Agricultural Education

Agricultural development has need of training people in the arts of agriculture and farming at degree level, at diploma level, at instructor level for the provision of research and advisory staff and at farmer level to learn modern techniques. In this field there were developments favourable and adverse in 1958. The Faculty of Agriculture at the Makerere College commenced the degree course in agriculture in 1958 and the first degrees will be gained in 1961, so that from then on there will be a regular source of recruitment of Africans, after two years' post-graduate training, into the ranks of Agricultural Officer although, from a study of the staff position likely to arise at that time, it is probable that only a proportion of the graduates will be able to find employment with Government. Until now, the Makerere College has given training in the diploma in agriculture. With the advent of the degree course, the College had planned to fade out the diploma course by 1965. However, with the staff at the disposal of the Faculty of Agriculture, it will be unable to take in a diploma entry in 1959, so that there will then be nowhere in East Africa where Africans will be able to train for the diploma. A careful review of how training in the diploma in agriculture could be begun in Kenya at minimum cost was commenced in 1958 because the needs of the Agricultural Department for diploma entrants and degree entrants is as 5 : 1. It is hoped that a solution will be found by reorganization of Government's agricultural training centres and some rearrangement of staff to keep the extra cost down and yet provide the numbers and calibre of lecturers that will be required.

African farmers who have shown the desire to farm their land more intensively have much to learn about running a planned farm, managing improved

livestock or growing cash crops while at the same time utilizing labour and finance economically and productively. The latter aspect struck Dr. John Raeburn, Lecturer, London School of Economics, when in the middle of 1958 he undertook a comparative study of land use before and after land consolidation and farm planning. It has been found that instruction in these arts of farming is best given by bringing groups of progressive farmers, their stockmen and their instructors in for short courses as each phase of farm development evolves. An urgent need of each major African agricultural district is to have a farmers' training centre and so far such centres have been developed in Nyeri (Wambugu), Meru (Nkuba) and Embu (Kianyaggo) with the aid of Chief Wambugu and the African district councils and in Kiambu (Kikuyu) with the aid of the Chief Waruhiu Memorial Fund, in Nandi (Kaimosi) for Rift Valley Province, and in Kericho (Kabianga) with the aid of United States International Co-operation Administration funds, and in North Nyanza (Bukura). Where farmers have undergone these courses, they can make the best progress on their farms if they can be helped with loans directed to productive purposes. Such funds are very limited at the present time and approaches have been made to various organizations for assistance towards providing rural credit. The development of planned farms can be accelerated by the provision of loans directed to productive purposes.

United States International Co-operation Administration Assistance

In the last four or five years the United States, through its International Co-operation Administration, has contributed or assigned £750,000 to Kenya to develop a number of projects of fundamental importance to sounder and more intensive use of the land, it has provided a team of experienced technicians to undertake specific investigations on our behalf in Kenya, Kenya men being trained alongside them, and it has made provision for a number of selected Kenya research and field officers to go to the United States to undergo further technical training in their particular fields, the dollar costs of these technical provisions and of certain equipment being additional to the figure quoted. Techniques for determining soil deficiencies by means of a fungal growth (*Cunninghamella*) have been developed by Dr. A. Mehlich at the Scott Agricultural Laboratories, while Dr. J. Thorp with his team of two soil surveyors, Mr. Woodruff and Mr. Miller, have completed a survey of 130,000 acres in the Songhor-Muhoroni area to classify the suitability of the soils for sugar-cane growing, selecting 70,000 acres as being moderately to well suited. They are now well ahead with a survey of a similar area in South Nyanza for the same purpose. Mr. Charles Enlow, leader of the I.C.A. team, has been working on the problems of the semi-arid pastoral areas of the country and preparing a report and, in this same field valuable assistance has come from the Fulbright Research Foundation, two research fellows working in Kenya in 1958, Dr. Harold F. Heady, Associate Professor of Ecology at the University of California, undertaking a study of the effect of livestock, game and fire on natural grasslands, and Dr. James C. Moomaw, Assistant Agronomist at the University of Hawaii, undertaking an ecological survey of the coastal strip and hinterland grazing areas.

While assistance with agricultural education has been noted above, I.C.A. funds have permitted the establishment of irrigation research stations at Mwea (Embu) and on the Kano Plains (Central Nyanza), irrigation experiments on the Lower Tana and the development of pilot irrigation settlement schemes at Tebere (Embu) and Perkerra (Baringo). Similarly, I.C.A. has financed the development of two pasture research stations in Baringo and Machakos to investigate the problems of restoration and management of denuded African grazing lands. A major contribution, too, has been made for surveys and African farm planning as part of Kenya's intensified development programme and to experimental work on cash and subsistence crops.

Weather

Climatic conditions during the year were characterized by a good Long Rains and a patchy and delayed Short Rains. In January, afternoon showers and thunderstorms occurred almost daily over the higher ground of the Rift Valley and Nyanza Provinces. Heavy storms were widespread throughout the Colony between the 22nd and 26th of the month. With the exception of this period Central and Southern Provinces were generally dry. In February unusual rains occurred over the whole Colony, except the Coast, during the second half of the month. Although normally one of the driest months 8-14 in. of rain was recorded in the Nairobi District and the coffee areas of Ruiru and Kiambu and 4-5 in. in the higher areas of the Rift Valley Province.

Although heavy rain and thunderstorms occurred in mid-March, the main rains did not really start until mid-April. There were some very heavy showers and thunderstorms during the first half of May. On the 3rd over 5 in. of rain fell in Mombasa, flooding several streets, whilst in Nyanza many areas of the Luo reserve were inundated. Parts of the main road between Nairobi and Thika were washed away by floods. June was generally cloudy with early morning drizzle in the Central Province and rainfall above average over the Kenya Highlands delayed planting in the higher areas. Wet conditions prevailed in July, particularly in Central Province which had a good Gathano period. Rainfall in August was mainly confined to the areas west of the Rift where falls varied from below average to above average. A few light showers fell along the Coast. In areas west of the Rift rainfall was slightly below normal for September. In other areas the month was mainly fair and dry. Rainfall was generally above average in the Nyanza and Rift Valley Provinces for the month of October. Showers which were heavy locally occurred in Central Province but, on the whole, amounts were below normal, particularly in the tea areas of both Embu and Nyeri. In the Coast and Southern Provinces conditions were mainly much drier than usual. November was much drier than usual in most areas and this continued until the second and third weeks of December when widespread rain, heavy locally in the Central and Rift Valley Provinces, occurred over the whole of Kenya during the second and third weeks of the month.

On the whole the total rainfall for the year was well up to average or above average except for the area along the Coast.

In the Rift Valley Province harvesting of 1957-planted crops was delayed by the early unseasonable rains and preparation of the land for planting on the Kinangop and in the Thomson's Falls areas was affected.

In Central Province Short Rains plantings were held up in all districts except Meru District which had a satisfactory year.

The Long Rains in Nyanza Province were generally favourable for crop production, permitting good land preparation, with dry spells for weeding and a dry period at harvest. The February rain in Southern Province delayed the clearing of crops off the land, with a resulting inability to gain maximum benefit from the Long Rains in April. Although late the Long Rains in the Coast Province were adequate to ensure good crops throughout the area.

(This section and Table A has been compiled mainly from notes provided by the Director of the East African Meteorological Department.)

TABLE A.—SOME FIGURES OF RAINFALL IN THE AGRICULTURAL AREAS OF KENYA, 1958

		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Kwale Agric. Dept.	Total	0·18	1·27	9·99	3·77	11·20	4·97	3·77	2·03	1·57	1·04	2·21	2·15	44·15
	%	14	165	452	62	120	133	122	91	60	30	59	58	106
Ruiru Jacaranda	Total	2·23	9·41	4·44	7·63	17·93	2·29	3·83	0·02	0·18	0·98	3·05	2·86	54·85
	%	114	1,034	151	73	302	112	518	2	12	35	68	88	144
Kakamega D.C.	Total	2·66	4·78	4·89	6·77	12·13	7·08	6·22	10·60	3·03	3·94	0·83	7·06	69·99
	%	121	135	90	69	115	92	89	118	42	86	22	220	95
Kenilworth, Kitale	Total	1·64	1·47	1·14	2·53	4·11	6·61	3·21	6·25	3·06	2·03	0·24	1·30	33·59
	%	216	173	41	45	66	145	63	104	89	68	11	119	81
Thomson's Falls Forest Station	Total	2·62	7·50	5·20	1·77	3·25	7·93	10·64	5·01	4·16	0·93	1·28	9·07	59·36
	%	220	577	243	35	84	202	202	72	151	67	48	393	153
Nyeri R.A. Little	Total	3·04	5·55	1·32	5·21	8·20	3·15	4·14	0·60	0·50	0·59	2·92	5·11	40·33
	%	136	305	67	59	110	263	290	27	30	21	58	168	102
Plant Breeding Station Njoro	Total	2·27	5·08	5·83	4·73	8·56	1·69	6·61	4·98	4·78	2·79	1·36	3·04	51·73
	%	229	416	227	91	195	50	149	102	187	142	52	168	144
Naivasha Exp. Station	Total	0·72	4·96	2·41	2·60	9·03	2·41	4·90	0·90	1·72	4·19	2·38	4·40	40·62
	%	56	464	113	54	246	109	285	44	90	208	96	317	152
Kapsabet Nandi Tea Estate	Total	1·42	3·71	4·76	6·80	5·07	5·12	4·00	4·74	2·74	3·84	2·30	3·95	47·03
	%	74	178	167	88	76	127	72	80	56	84	97	112	90
Molo Sundu River Farm	Total	2·00	7·72	1·76	2·41	5·03	9·78	5·33	9·33	4·17	3·79	2·15	3·41	56·79
	%	161	589	62	37	79	169	81	103	84	142	104	190	111
Lumbwa M'Taragon	Total	3·57	4·97	8·11	4·78	8·93	6·47	6·56	7·60	3·03	3·06	0·41	2·07	59·54
	%	219	208	212	64	135	133	119	125	76	124	15	92	119

Food Production in African Areas

In Nyanza Province Long Rains crops were above average in all areas. Favourable weather enabled land to be prepared and weeded better than is usual and the campaign for row planting and the placement of manure helped to increase yields more especially in North Nyanza. The surplus of food crops offered for sale would have been greater but for the failure of the Short Rains to come in good time, resulting in crops being retained for home consumption. Good yields of maize and other food crops were obtained in the African districts of Rift Valley Province and it is expected that these districts will be self-supporting in the ensuing 12 months as a result.

In Central Province the Long Rains crops were generally good apart from some water-logging of crops in parts of Fort Hall and Kiambu Districts. The dry period following the Long Rains, however, restored the position, and a large surplus of maize and beans were exported from the Province. In the Southern Province maize continued to be the most widely grown crop. Some 40,000 bags passed through Maize Control as surplus to requirements, but overselling in the mid-year necessitated subsequent limited imports. Reasonable harvests of all food crops were obtained in the Coast Province from Long Rains plantings. The Short Rains, however, were a failure and although little is planted at the Coast in that season in the Taita lowlands, where a crop is normally expected, this may result in a serious food shortage in some localities. A shortage of food generally throughout the Province is likely before the 1959 Long Rains crops are harvested.

Agricultural Exports

The total value of agricultural exports increased from £23,448,278 in 1957 to £26,320,584 in 1958.

Exports of the following commodities exceeded £500,000.

	Position in 1957	*1957* £	*1958* £
1. Coffee	(1)	10,812,281	10,422,722
2. Tea	(2)	2,860,612	3,216,977
3. Sisal	(3)	2,078,012	2,227,997
4. Maize	—	466,062	1,867,061
5. Pyrethrum (inc. Extract)	(5)	1,103,554	1,814,085
6. Wattle	(4)	1,521,875	1,024,166
7. Butter	(7)	506,959	945,681
8. Pineapples	(8)	584,358	555,351
9. Cotton	—	369,722	514,846

Table C gives the domestic quantities and value of exports of Kenya produce for the years 1939 and 1955-58 inclusive.

Crops

Cashew Nuts.—Coast producers had a successful season receiving 30 cents per lb. of raw nuts for the first 1,000 tons of crop. The total crop was 1,900 tons and the estimated overall average price 27 cents. Growers realized a total of approximately £57,500. Marketing of the crop was arranged through a single agent. Very heavy and unseasonal rain at harvest resulted in the crop deteriorating rapidly in store and consequently a marketing loss of £7,650 was sustained. Of the production of 1,900 tons, 810 tons was processed locally and the remaining 1,090 tons exported to India. The 1958/59 crop promises to be of good

quality and is being marketed through four licensed exporters and one processor. The trial plantings in the lower areas of Embu District have been maintained.

Cassava.—In Nyanza Province there was an increase in plantings of mosaic-resistant varieties in all areas except Kericho and Elgon Nyanza. Only a small increase in sales was, however, recorded growers looking upon this crop as a famine insurance. The crop is grown extensively on the Elgeyo side of the Kerio River where yields are good, resulting in a surplus. Attention is still being devoted to increasing the acreage of the crop in the lower areas of Central Province as a famine reserve. In the Coast Province cassava is a major food crop and some 300 tons is estimated to have been consumed in Mombasa from surrounding districts.

Castor Seed.—Exports from Southern Province, mainly Kitui District, amounted to 3,953 tons, valued at £151,786 in 1958. Some 452 tons were produced in the Coast Province, worth £15,556 to Malindi and Taita growers.

Crops (*Scheduled, section* 109, *Agriculture Ordinance,* 1955)

Production estimates for the 1958 crops from Scheduled Areas are:—

	Acreage	*Average yield Bags per acre*	*Total yield Bags*
Wheat	238,812	4.80	1,169,749
Maize	129,866	8.68	1,128,411
Barley	63,761	7.81	498,116
Oats	27,354	8.00	218,974
Sunflower	15,618	4.49	70,255
Linseed	2,172	3.65	7,937

For comparison, actual production figures for the 1957 crop were:—

	Acreage	*Average yield Bags per acre*	*Total yield Bags*
Wheat	239,148	4.78	1,143,303
Maize	166,689	7.92	1,350,754
Barley	51,507	6.67	343,824
Oats	25,785	6.88	177,597
Sunflower	10,452	4.30	44,943
Linseed	735	2.73	2,013

Deliveries to the Maize Control during the past two crop years ending 31st July were:—

	Bags of 200 lb. net	
	1956/57	*1957/58*
Non-African areas	896,116	979,055
African areas	637,905	780,052
	1,534,020	1,759,107

Of the 780,052 bags of African-grown maize 506,709 bags came from Nyanza Province and 154,729 bags from Central Province.

The guaranteed f.o.r. price for Grade II maize from the 1958 crop was Sh. 37 per 200-lb. bag naked. The equivalent price for Category 1 (White), Grade I wheat was Sh. 58/50 per 200-lb. bag naked. For the other scheduled crops minimum prices were fixed as follows:—

Barley	180 lb. net in bag	..	Sh. 22
Oats	150 lb. net in bag	..	Sh. 20
Sunflower	100 lb. net in bag	..	Sh. 21
Linseed	200 lb. net in bag	..	Sh. 70

Cereals, Other.—56,879 bags of millets and sorghums were purchased by Produce Control and the Nyanza Province Marketing Board during the year, valued at £93,470.

Chillies.—Due to a substantial fall in price this crop was neglected in some areas of the Coast Province where it is mainly grown. Taita, the most important producing area exported 287 tons worth £17,000, and Kwale 381 tons worth £6,500.

Coffee.—The area planted by European growers is approximately 62,000 acres. Total production from the 1957/58 crop amounted to 20,837 tons, compared with the previous crop of 18,350 tons. The crop was valued at £9,246,316. Export figures are in Table C.

Particulars of the expansion of the African-grown crops are given in Table B.

The cup presented annually by the Kenya Coffee Board was retained by Meru District in 1958, being won by the Muthambe Society. The quality of the Central Province crop was maintained in 1958 in both Embu and Meru Districts and a marked improvement was recorded in Fort Hall and Nyeri in spite of the incidence of Coffee Berry Disease.

In South Nyanza there was a decline in the quality of the early crop due to *Hemileia vastatrix* and to over bearing. In Elgon Nyanza, however, there was an improvement in crop quality as a result of a manuring and pruning campaign, drier weather reducing the incidence of rust and a general improvement in cultural standards.

Following the opening of the first coffee factory in North Nyanza, the demand for seedlings has far exceeded the supply of rust-resistant material available. Some progress is recorded in Central Nyanza and Kericho Districts. Limited planting of Robusta Coffee is proceeding in suitable areas of the Province below 4,500 feet a.s.l. Some good quality coffee has been produced from the small plantings in Machakos District and plans for an expansion of acreage are proceeding. 340 acres of coffee are now established in the Taita Hills of Coast Province.

Coconuts.—The total area under this crop at the Coast remains static at about 50,400 acres, three-quarters of this total being African-grown. The main income is from palm toddy in the African plantations, which finds a ready sale in Mombasa and Malindi. Millers purchased 1,670 tons of copra at an average price of Sh. 17 per frasila. It is estimated that 60 per cent of this total came from Kwale District where the palm toddy trade is not so flourishing and the remainder from the Kaloleni, Kilifi and Malindi areas. Coir purchases amounted to 1,117 tons, of which 790 tons went overseas, and a further 100 tons to Nairobi, the balance being sold locally.

TABLE B.—PARTICULARS OF AFRICAN-GROWN COFFEE AS AT 31-12-58

District	Total Planted Acreage	Production in 1958		Value to Grower	No. of Growers	No. of Nurseries	No. of Seedlings in Nurseries	No. of Factories	No. of Co-op. Societies
		Tons		£					
		Clean	*Mbuni*						
ARABICA—									
S. Nyanza	2,996	457	524	170,000	11,136	69	842,239	20	25
Elgon Nyanza	1,717	60	40	46,163	8,000	16	440,000	12	16
North Nyanza	364	9	4	3,630	2,225	6	94,113	1	8
Central Nyanza	10	Nil		Nil	146	3	80,000	—	1
Kericho	36		1¼	150	130	2	61,000	—	1
ROBUSTA—									
Elgon Nyanza	47	Nil		Nil	255	3	30,000	—	—
North Nyanza	30	Nil		Nil	318	1	5,200	—	1
Central Nyanza	24	Nil		Nil	233	3	16,000	—	—
ARABICA—									
Teita Hills	340	15	13	8,335	1,520	1	85,000	1	1
Machakos	502	67	19	33,220	2,751	13	277,000	2	5
Meru	6,889	973	104	512,579	22,718	37	900,000	37	13
Embu	3,680	386	60	206,173	12,067	14	790,590	22	11
Nyeri	1,590	172	—	76,617	5,427	13	360,800	8	3
Fort Hall	1,339	98	52	49,367	5,543	21	427,905	7	7
Kiambu	737	34	—	12,240	3,012	21	432,870	1	6
TOTALS ..	20,301	2,271	817	1,130,474	75,482	223	1,482,717	111	98

Cotton.—The final production figures for the 1957 crop, which was ginned early in 1958, were:—

		Bales of Lint of 400 lb.		
	Acres	*AR*	*BR*	*Total*
Nyanza Province ..	61,000	8,060	1,147	9,207
Coast Province ..	25,000	1,881	459	2,340
	86,000	9,941	1,606	11,547

Prices paid to growers in cents per lb.:—

	Coast		*Nyanza*	
	1957/58	*1958/59*	*1957/58*	*1958/59*
AR	60	48	57	46
BR	20	18	22	18

The Coast crop is estimated to yield 4,200 bales and the Nyanza crop 12,000 bales. The campaign in Nyanza Province in favour of early planting met with some success in South Nyanza and in Elgon Nyanza, but not elsewhere. Cotton planted late, i.e. in June and July, suffered from dry weather; even so, it is doubtful if growers will be persuaded to plant earlier. The quality of the cotton produced at the Coast in the main Malindi producing area has been remarkably good and there are indications of a change to pure-stand planting in that area which will lead to higher yields if accompanied by dusting against pests.

The Coast Province crop was sold by the Kenya Cotton Lint and Seed Marketing Board by tender and the Nyanza crop through the agency of the Uganda Lint Marketing Board which continues to be extremely helpful to the Kenya Cotton Board.

Export figures are in Table C.

Essential Oils.—There are four producers in Nyanza Province with a total area of 200 acres under crop. Production, however, only amounted to 160 lb. worth £720. Export figures are in Table C.

Groundnuts.—The Nyanza Province Marketing Board purchased 21,726 bags of shelled nuts (180 lb.) in 1958. This, with the addition of 407 bags from Rift Valley Province made up the total crop of 22,133 bags worth £87,757. Progress is being made with the establishment of this crop in the Southern Province, where some 60 acres were planted in Machakos District during the Short Rains at the end of the year. Trial plots in Lower Embu and Fort Hall Districts of Central Province have not so far proved the crop for these areas.

Kapok.—Production figures for 1958 were 66 tons valued at £2,227.

Maize.—*See* Crops, scheduled.

Passion Fruit.—The factory at Sotik serves five growers who delivered 83,773 lb. of fruit in 1958. 2,744 gallons were processed. Local sales amounted to 352 gallons. It is estimated that there are now 1,200 African growers in North Nyanza and 300 in Elgon Nyanza who are disposing of their fruit on local markets as a result of the closure of a factory at Kitale. The return amounts to 30 cents a lb. when disposed of locally as compared with 12 cents at the factory.

Pineapples.—Sales of pineapples from the Central Province increased from 6,445 tons in 1957 to 8,549 tons in 1958 worth £71,806. Of this production, 8,194 tons came from Kiambu District. Confidence is returning to this industry and the planted acreage is being expanded, particularly in Kiambu. Sales of European-produced pineapples to canneries amounted to 5,294 tons.

Potatoes.—Production in Central Province was 50,096 bags valued at £55,830 compared with 94,947 bags valued at £100,689 in 1957. The total acreage of the crop grown on European farms is 1,900 acres, mainly in Nakuru and Naivasha Districts of Rift Valley Province. In the African areas of this Province 1,500 acres were planted in Elgeyo District.

Pulses.—Deliveries in the crop year ending 31st July were:—

	Bags (200 lb.) 1957/58
Beans, various	104,658
Field peas	858
Cowpeas, grams and others	33,168
	138,684

Recorded sales in Provinces are given in Table D and exports in Table C.

Pyrethrum.—Production of dried flowers was 3,823 tons in 1958. There are 873 licensed growers including African Co-operative Societies. The acreage planted by European growers is 20,400 acres. African growers in the Central Province now have 2,726 acres under crop, mainly in Kiambu District. There is a further estimated 1,000 acres in South Nyanza and 140 acres in Elgeyo District. Production in the Central Province amounted to 270¾ tons worth £70,176, and in South Nyanza 113 tons worth £18,984.

Rice.—Production in Nyanza rose from 37,498 bags valued at £59,786 in 1957 to 57,191 bags valued at £103,135 in 1958. Deliveries to Produce Control totalled 47,424 bags of 160 lb. of paddy valued at £87,724. 12,553 bags came from Central Province. Of the two main varieties grown in Nyanza, Sindano and Shingo la Majani, it has been decided to concentrate on the Sindano as the other one cracks badly in milling.

Sisal.—Production in 1958 amounted to 46,025 tons. The Machakos African Sisal Scheme was closed down throughout the year. Only 40 tons of village processed sisal was exported from Southern Province in 1958 worth £2,400.

Sugar.—Production figures for Kenya factories in 1958 were 21,695 tons at Miwani and 6,182 at Ramisi, totalling 27,877 tons compared with 20,822 tons in 1957.

The almost total failure of the Short Rains at Miwani is estimated to have reduced yield by some 25 per cent. The Miwani Mills crushed 234,952 tons of cane to produce 21,695 tons of white sugar worth £1,027,292. Of the total tonnage of cane crushed 52,078 tons were bought from individual farmers the price paid being Sh. 40/96 per ton of cane delivered at the factory. Average yields of 50 tons cane per acre are being obtained at Chemelil with irrigation and the use of fertilizers.

The Nyanza Farmers Co-operative Society marketed 2,131 tons of Jaggery worth £62,825 during the year to Asian growers.

In South Nyanza two new jaggery factories commenced operations, bringing the total to three, but even so they were unable to cope with existing cane and no new plantings were made. In North Nyanza jaggery production of 261 tons was derived from the Shiambere African Co-operative Society, the African District Council Mobile Unit, and the Mumias and Butere factories, both Asian owned.

A detailed soil survey of the Songhor/Muhoroni/Chemelil area has been carried out by a team of soil surveyors provided under the American Aid (I.C.A.) Programme to ascertain the acreage in that area suitable for cane production.

At Ramisi in the Coast Province the sugar cane area has been increased to 8,674 acres and irrigation works installed.

Tea.—The estimated increase in acreage under tea during 1958 was 2,300 acres, bringing the estimated total under tea up to 32,300 acres. Total production in 1958 of made tea was 25,179,164 lb., distributed as follows:—

	lb.
Kericho	19,908,994
Kitale	23,738
Limuru	1,568,887
Molo	200
Nandi	2,323,687
Sotik	1,290,150
Central Province (African-grown)	63,508

During the year the Nyanza and Rift Valley Provinces Tea Board was gazetted and the first meeting held in November. The Board is now taking over financial responsibility for nursery and other developments. The total planted acreage in South Nyanza is now 60 acres, in Kericho 64 acres and North Nyanza 2.4 acres, and a large nursery was established in the Nandi District in 1958.

In the Central Province a further 200 acres were planted, bringing the total area under tea to 691 acres, mainly in Nyeri and Embu, with a small acreage in Kiambu. Production of made tea from the Ragati factory amounting to 63,508 lb. represented a percentage of 21.29 per cent on the total green leaf handled.

Tobacco.—The marketing of this crop continued to be organized by the East African Tobacco Company, whose exclusive buying licence was renewed in 1958 for a further period of seven years. Prices paid for Grades 1, 2 and 3 green leaf were 12, 8 and 3 cents, respectively. For cured leaf bought from growers in

Kitui, the average pay-out was Sh. 2/41 per lb., ranging from Sh. 5/10 for Grade A to 60 cents per lb. for scrap. Production figures are:—

Area	*Acreage*	*Green Leaf Purchased lb.*	*Cured Leaf lb.*	*Value £*
Kitui ..	432	888,394	25,483	6,940
Ena ..	470	822,906	—	3,622
Sagana ..	180	1,500,933	—	6,385
Total	1,082	3,212,233	25,483	16,847

Vegetables, Fruit and Flowers.—Total sales in the Central Province were:—

	Value £
Flowers—	
164,100 bunches	2,735
Bananas—	
5,418 tons	28,395
Fruit and Vegetables—	
11,255 tons	183,960
Miraa (*Catha edulis*)—	
62,752 bundles	56,468
Total	£271,558

Figures for the Southern Province were:—

	£
Fruit—	
543 tons	28,660
Vegetables—	
1,121½ tons	58,299
Tomatoes—	
36 tons	1,262
Onions—	
4,247 bags	22,859
Total	£111,080

Production in the Taita Hills of the Coast Province further declined to 535 tons in 1958, valued at £11,984 owing to the weather, the financial difficulties of the Vegetable Growers Co-operative and a falling-off of interest by growers. Banana production realized £22,671 to African producers in Malindi and Kwale Districts. In North and Central Nyanza banana sales realized £41,000. The sale of mangoes from Malindi realized £8,463.

Wattle.—Production in Central Province, the main African producing area, amounted to 25,613 tons valued at £251,357 compared with 23,549 tons valued at £280,212 in 1957. Total production of extract in 1958 amounted to 20,638½ tons compared with 21,421 tons in 1957.

Export figures are given in Table C.

Wheat.—*See* Crops, Scheduled.

Livestock Products

Particulars of production from the African areas are given in Table D. Figures for export of these products are given in Table C.

TABLE C.—QUANTITIES AND VALUES OF EXPORTS OF KENYA PRODUCTS, 1958

Commodities	Unit	Quantities					Values				
		1939	1955	1956	1957	1958	1939	1955	1956	1957	1958
							£	£	£	£	£
Cattle	Number	—	601	831	395	260	—	25,740	25,313	12,550	7,587
Sheep and Goats	,,	—	167	51	284	280	—	605	224	621	831
Bacon and Ham	cwt.	1,376	4,837	3,593	11,767	38,911	9,080	70,998	56,770	172,069	406,346
Beeswax	,,	1,208	1,381	919	827	1,576	5,162	32,776	25,123	20,329	36,872
Butter and Ghee	,,	21,277	30,405	38,170	31,080	65,716	90,659	517,646	620,402	506,959	972,549
Cheese	,,	652	483	1,166	758	749	2,987	6,070	16,994	11,500	10,675
Hides (shade dried)	,,	19,245	45,505	45,020	82,271	60,837	53,372	457,396	490,037	799,286	553,226
Skins (sheep and goat, shade dried)	,,	337,082	28,480	42,200	29,464	23,600	18,152	661,801	514,015	629,844	449,175
Hides (sun dried)	,,	21,737	1,723	559	233	892	43,444	12,070	3,945	1,591	5,393
Skins (sheep and goat, sun dried)	,,	1,014,543	542	784	354	284	40,900	8,315	4,110	4,321	3,656
Other Hides and Skins	,,	—	23,989	21,961	408	147	—	159,359	153,425	27,819	6,349
Wool	100 lb.	15,114	13,818	16,666	16,210	16,665	56,578	256,908	279,616	289,677	309,253
Crop Produce											
Coconuts and Copra	Ton	215	645	80	102	542	1,561	34,865	3,568	2,259	19,808
Coffee	cwt.	338,125	388,468	534 214	445,677	500,536	800,827	8,926,908	13,674,568	10,812,281	10,422,722
Cotton	100 lb.	59,677	52,249	69,045	31,097	49,294	124,021	691,649	852,474	369,722	514,846
Sisal	Ton	29,163	33,502	35,205	39,598	42,147	442,434	1,958,631	2,075,303	2,078,012	2,227,997
Flax	,,	16	9	—	2	—	810	1,296	—	103	—
Beans and Peas	cwt.	123,002	12,891	5,983	8,635	63,592	40,250	36,784	18,677	23,590	129,384
Maize	,,	1,007,125	1,543,033	84,706	452,177	1,956,644	222,037	1,665,422	89,403	466.062	1,867,061
Maize Meal and Flour	,,	122,029	12,553	479	368	11,248	25,450	17,107	817	714	22,263
Pulses other than Beans	,,	7,756	—	—	—	—	2,702	—	—	—	-
Wheat	,,	973	—	—	—	2	393	—	—	—	3
Wheat Flour	,,	63,883	15.270	1,787	1,668	2,580	50,655	40,697	4,770	4,705	8,531
Grain other than Maize and Wheat	,,	14,618	18,162	84,484	691	849	4,424	29,317	144,074	1,750	1,999
Groundnuts	Ton	402	½	1,760	2,039	1,427	4,442	56	107,755	146,172	95,414
Cashew Nuts	,,	32	1,094	1,891	1,714	1,745	1,812	49,045	144,162	114,898	108,792
Castor Seed	,,	—	4,905	3,453	4,325	6,932	—	195,653	206,686	271,733	311,894
Sunflower Seed	,,	477	1,221	1,272	1,283	1,550	3,997	54,288	46,016	53,759	52,046
Coconut Oil	cwt.	33,152	693	1,987	208	1,129	2,346	3,461	9,821	1,177	6,038
Essential Oils	,,	3,660	1,013	730	1,051	717	4,956	41,312	29,731	32,687	20,107
Groundnut Oil	,,	6,233	—	315	16	6	680	—	1,835	120	34
Sesame Oil	,,	89,944	280	89	171	412	10,008	1,946	565	1,249	2,673
Potatoes	,,	173,046	16,000	18,120	31,454	43,636	29,199	17,302	18,823	37,420	51,989
Pyrethrum	,,	55,628	18,553	26,180	34,636	36,125	357,170	284,732	390,183	506,254	524,766

TABLE C.—QUANTITIES AND VALUES OF EXPORTS OF KENYA PRODUCTS, 1958—(*Contd.*)

Commodities	Unit	Quantities					Values				
		1939	1955	1956	1957	1958	1939	1955	1956	1957	1958
							£	£	£	£	£
Sugar	cwt.	81,463	440	311	791	350	50,308	1,376	993	2,538	1,160
Pineapples	100 lb.	—	—	138,067	115,355	115,322	—	—	765,631	584,358	555,351
Tea	cwt.	88,627	115,572	139,125	143,878	162,723	501,732	2,761,151	2,615,677	2,860,612	3,216,977
Wattle Bark	,,	226,716	162,713	118,230	83,992	59,020	72,846	265,412	193,438	134,452	94,615
Wattle Extract	,,	131,312	664,465	436,258	526,296	379,646	91,439	2,260,853	1,501,332	1,521,875	1,024,166
Passion Fruit Juice	,,	22,744	—	—	gal. 4,088	gal. 3,240	6,713	—	—	3,253	2,176
Pyrethrum Extract	,,	—	2,443	2,049	1,537	3,435	—	953,746	810,397	597,300	1,289,319
Other Agricultural Produce	,,	—	—	—	—	—	54,446	193,414	281,448	340,717	986,541
Total							£ 3,242,495	22,696,097	26,178,121	23,446,278	26,320,584

TABLE D.—QUANTITIES AND VALUES OF MORE IMPORTANT PRODUCTS MARKETED FROM THE AFRICAN AREAS (PARTLY ESTIMATED)

Produce	Unit	Nyanza Province		Central Province		Southern Province		Coast Province	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
			£		£		£		£
Bananas	Tons	—	41,000	5,418	28,395	—	—	—	22,671
Beeswax	36 lb.	—	—	488	1,076	2,747	16,670	3	30
Cashew Nuts	Tons	—	—	—	—	—	—	1,900	57,500
Cassava	125 lb.	2,269	1,337	—	—	—	—	—	28,125
Chillies	Tons	—	—	—	—	—	—	672	23,764
Coffee (Parchment and Mbuni)	Tons	1,090	218,174	2,505	1,007,484	86	33,220	26	7,178
Copra	Tons	—	—	—	—	—	—	2,033	128,625
Coconuts	Number	—	—	—	—	—	—	10,662,500	106,625
Corriander	90 lb.	—	—	—	—	207	698	—	—
Castor Seed	180 lb.	173	434	3,730	7,559	48,000	151,786	5,420	15,556
Cotton Lint	lb.	11,472,413	273,117	—	—	—	—	3,075,727	74,988
Eggs	Number	1,777,248	15,905	135,108	1,487	478,656	7,394	—	—
Charcoal, Fuel, Poles	—	—	—	—	82,508	—	1,100	—	—
Ghee	36 lb.	16,404	68,181	—	—	947	5,033	—	—
Groundnuts	180 lb.	30,332	118,138	—	—	—	—	—	—
Hides	Number	—	197,399	86,198	67,391	69,599	39,263	—	—
Kapok	lb.	—	—	—	—	—	—	147,800	2,227
Maize and Maize Meal	200 lb.	579,836	717,909	186,769	254,515	28,171	45,098	7,320	99,890
Millets and Sorghums	200 lb.	73,662	98,006	18,930	25,287	3,585	3,657	—	—
Miraa (*Catha edulis*)	Bundles	—	—	62,752	56,468	—	—	—	—
Potatoes (English)	180 lb.	5,907	1,665	50,096	55,917	1,834	2,063	—	—
Poultry	Head	—	1,035	17,126	2,834	161,213	35,837	—	—
Pulses	200 lb.	12,444	25,907	144,408	302,141	12,359	37,396	1,360	8,000
Pyrethrum	Tons	113	18,984	270	70,176	—	—	—	—

TABLE D.—QUANTITIES AND VALUES OF MORE IMPORTANT PRODUCTS MARKETED FROM THE AFRICAN AREAS (PARTLY ESTIMATED)—(*Contd.*)

Produce	Unit	Nyanza Province		Central Province		Southern Province		Coast Province	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
			£		£		£		£
Rice (Paddy)	160 lb.	57,191	103,135	16,030	29,706	—	—	1,582	4,988
Pineapples	Tons	—	—	8,547	71,488	—	—	—	—
Sesame	180 lb.	5,571	22,994	—	—	—	—	2,600	12,978
Sisal	Tons	—	—	—	—	40	2,400	—	—
Skins	Score	18,442	62,567	14,894	48,387	12,452	40,975	—	—
Tobacco Flue Cured	lb.	—	—	2,323,339	9,578	—	—	—	—
Tobacco Native Cured ..	lb.	—	—	500,072	16,501	—	25,000	—	—
Vegetables, Flowers and Fruit	Tons	—	10	11,371	189,317	2,274	116,105	—	30,343
Wattle Bark	Tons	56	434	25,613	251,357	1,200	12,000	420	3,944
Total Value, 1958 ..			1,997,331		2,580,565		575,695		627,432
Total Value, 1957 ..			2,032,478		2,109,195		539,552		534,990

PART II—RESEARCH AND SPECIALIST SERVICES

Some of the most important new developments in the Research Division of the Department in 1958 were in the field of soil science and these are reported on later in fuller detail. Dr. Thorpe, a distinguished American authority on soil classification arrived during the year on an 18-month visit under I.C.A. auspices. He was joined later by two experienced American soil surveyors. An officer of this Department has been attached to the American team for training in their procedures. Dr. Mehlich, another American specialist working on an I.C.A. project, pressed on with the introduction of the rapid routine procedures for the assessment of soil fertility, which he had tested in 1957 and found suitable for Kenya conditions. The careful interpretation into practical recommendations of the results of analyses made possible on a large scale by these rapid procedures should confer considerable benefits on Kenya agriculture.

The new laboratories at the Plant Breeding Station, Njoro, were opened during the year and the expanded breeding programme is now under way.

A new station in Nyanza Province, to be known as the Kano Plains Irrigation Station, was developed to an advanced stage by the end of the year. Another development in irrigation research was the expansion of the programme of experiments at the Hola Irrigation Scheme.

The Tree Crops Station at Mtwapa in the Coast Province, and the two small coffee stations at Kisii and Meru in Nyanza and Central Provinces, respectively, all of which are of recent origin, were brought to a fairly advanced state of development, as was also a small Tea Research Station at Kagochi. This latter station will serve the African tea areas. A number of experiments are already established there.

The headquarters of the Horticultural Section was moved from Molo to Thika, which is a better administrative centre and more typical of a large area of potentially important horticultural development. The staff of this section was strengthened by the addition of an experienced horticultural officer.

An intensified programme of work on the potato crop was initiated in 1958. Bacterial wilt of potatoes assumed more serious proportions than hitherto and this aspect of the crop will have to receive special attention.

The staff of the Entomological Section was increased by the addition of a port entomologist stationed at Mombasa.

Two American Fulbright scholars arrived in Kenya in 1958. Dr. Moomaw is engaged on an ecological survey of the coastal strip of Kenya and Professor Heady is undertaking an assessment and description of the semi-arid pastoral areas of Kenya, and studying the effect of animals (both game and domestic) on the grasslands and their effect on bush encroachment, together with an examination of the effectiveness of various measures of control.

Two new Research Advisory Committees were constituted during 1958, one being for the Molo Horticultural Station and the other for Marindas Grassland Station.

General Husbandry

Grassland.—In addition to the main pasture research carried out by the Pasture Research Team and reported later, pasture experiments were, as usual, undertaken at many of the general research centres in 1958.

In a ley species trial at Sotik, Rhodes grass, setaria and star grass, each with Kenya white and Louisiana clover, were compared. Setaria yielded best of the grass species and both it and Rhodes grass significantly outyielded star grass over the first year. The Kenya white clover outyielded the Louisiana clover. This same experiment included a comparison of 150 lb. double superphosphate per acre versus nil and demonstrated that under Sotik conditions a phosphate dressing is essential. It gives more bulk, a better balanced sward and less weed in the sward. At Kakamega Nzoia Rhodes grass still led seven other strains of Rhodes grass in the second year of production, both as regards bulk and palatability, but two other strains, Chepararia and Endebess, were also promising. A trial at Ol Joro Orok on suitable grass varieties for vlei soils showed that despite water-logging for over two months ronpha and Kentucky blue grass splits and S.24 ryegrass have grown well. In the Coast Province the Biloela strain of *Cenchrus ciliaris* and Endebess Rhodes grass looked the best species in small plots.

A top-dressing trial at Sotik on a setaria ley showed that the effect of sulphate of ammonia, even at high rates of application, is short lived. The effect of 3 cwt. per acre was lost after only one grazing. The effect of a top-dressing of super-phosphate, however, was lasting. At Kanja farm, in Embu District, a manuring trial on established Kikuyu grass showed highly significant responses to various treatments. The residual effect of double superphosphate and the effect of reapplied sulphate of ammonia were significant at P.O. 001, both fertilizers being applied at the 2 cwt. per acre level. The effect of 10 tons of farmyard manure reapplied at the beginning of the season, was also significant at the same level of probability. Agricultural lime had been applied in this experiment in 1956 at 6.6 tons per acre. Significant increases in yield were obtained as a result of this treatment in the May and July cuts of 1957 only; thereafter the effect faded away. Napier grass mulching also had a pronounced effect on the productivity of the Kikuyu grass in this same experiment. In a separate trial close night paddocking of cattle on Kikuyu grass resulted in spectacular improvement in production.

At Sotik an experiment on undersowing grass to maize showed the method to be successful when the maize population per acre is about 14,000 plants (3ft. × 1 ft.) and when the grass is not sown before the maize is about 3ft. high. There is little loss in the yield of maize and the subsequent ley is good. At Ol Joro Orok work on undersowing grasses to barley, oats, wheat and linseed has confirmed the 1957 result that linseed is the best cover crop, with oats taken for silage the next best. Wheat and barley are comparatively poor.

Fertilizers and Manures.—The large-scale programme of fertilizer trials in all areas, carried out co-operatively by the soil chemistry staff and the general investigations staff, is reported on later under the heading "Soil and Agricultural Chemistry". In addition a number of experiments outside this co-operative programme were conducted exclusively by the general investigations staff.

Trials with fertilizer applications on potatoes on the Kinangop have shown that NPK applications can give over 16 tons per acre, compared with about 9 tons from control. Further trials showed that the best potato fertilizer on rich land in this area, consists of 1½ cwt. sulphate of ammonia, 1 cwt. double super-phosphate, and ½ cwt. sulphate of potash per acre. Sulphate of potash is preferable to muriate where eating quality is concerned.

At Kitale an experiment to determine the best stage to apply nitrogen to maize has shown, over four years, that the knee-height stage is the optimum time for application. In 1955, 1956 and 1957, the mean increase in yield from a 2 cwt. per acre application of sulphate of ammonia at this stage was 3.46 bags per acre. In 1958 the same treatment gave an increase of 3.41 bags. Later applica-

tions of nitrogen, e.g. at tasseling, produced no benefit at all. A similar trial in Southern Province confirmed this result with regard to the best time of application. A 1 cwt. per acre application of sulphate of ammonia is shown to be adequate in that area.

In Central Province, at Kanja farm, the benefit of farmyard manure and double superphosphate both in maize and potato crops was confirmed, whereas 3-ton and 6-ton per acre applications of lime appeared to be totally uneconomic. At Embu farm the application of farmyard manure, phosphate, and nitrogen, after ploughing out a productive Rhodes grass ley, gave no responses in maize, potatoes or sweet potatoes, whereas such responses are normal in arable cultivation in this area. The advantages claimed for ley farming in the star grass and lower Kikuyu grass zone, which Embu farm represents, would appear to be real, provided the ley is a good and productive one.

Fertilizer results from the Coast Province have shown that urea applications can increase yields of cotton in the main cotton areas. On the poor soils of the Shimba Hills, where large phosphate effects are usual, basic slag and double superphosphate applied in 1957 had substantial and equal residual effects in 1958. Trials on the time of application of nitrogen to cereals have shown that split dressings are best under coast conditions, half at planting and half as a top dressing at an active period of growth. Another interesting result is that light annual dressings of fertilizers and of manure have both kept up yields on light sandy soils at Matuga over six years of continuous cropping.

Crops.—A maize spacing trial in Nyanza Province, replicated at Kakamega, Siriba, Busia and Kimilili, showed that a 3 ft. × 1 ft. spacing gave the most consistently good yields. Wheat was shown to be a possibility in the Sotik area, where the best yield in a variety trial was $6\frac{1}{4}$ bags per acre.

Apart from the results of fertilizer trials with potatoes reported above, the most interesting other effect with this crop was that produced by chitting. It was found in the Rift Valley Province that chitted seed gave twice the yield of unchitted.

In cassava trials at the Coast there were no differences in yield between crops grown on ridges and those grown on the flat or between plant spacings of 3 ft. × 4 ft. and 3 ft. × 6 ft.

At Homa Bay a groundnut variety trial showed no significant difference between Asiriya Mwitunde and S.720, the previously best variety for the area. The 1 ft. × 1 ft. spacing of the crop was better than wider spacings, and planting on the flat appeared to be superior to planting on the ridge.

Cotton trials at the Coast confirmed previous results. UK.51 and UK.55 varieties did not differ in yield under coast conditions, although UK.55 has been shown to yield slightly higher than UK.51 elsewhere. A slight improvement in yield resulted from tie-ridging, but the increase was not sufficient to warrant the extra work involved. Spacings varying from 3 ft. × 2 ft. to 3 ft. × 9 in. had no influence on yield. Early planted cotton once again out-yielded that planted later, the increase being larger on sprayed than on unsprayed cotton. The necessity for adequate control of weeds was spectacularly demonstrated by the complete failure of the unweeded cotton in another trial.

Trials of Turkish tobacco of the "Selouk" variety were undertaken on an observation basis in several areas. Best results to date have been obtained at the coast, in the Tana River area, where quite good samples were produced.

There have been trials with a whole range of miscellaneous crops to try to assess the possibilities of finding alternative crops or new crops for certain areas. For example at Kitale, where an alternative crop to maize is of current interest, plots of the following were established: castor, soya beans, simsim, linseed, lentils, green grams, Michigan peabeans, sweetcorn, groundnuts, niger oil and *Sesamum angolense*. The *Sesamum angolense* crop is being tried for the production of a synergist for pyrethrum formulations. In Nakuru District cotton has been tried as a new crop with considerable success. Elsewhere plots of alternative crops have been established at most stations.

Mention might be made, for the first time in these reports, of experimental work on tea. Experiments under the auspices of this Department have been started with this crop only recently, so that they are all still in a preliminary stage. Cycle-of-pruning and time-of-pruning trials are in progress and fertilizer and spacing trials have been established.

Rotations.—In a rotational trial at Embu last year's result, which showed that maize following sweet potatoes yielded better than maize following English potatoes, which in turn yielded better than maize following maize, was confirmed in a second trial.

Animal Husbandry

Cattle.—Trials were carried out at the Eldoret and Kitale stations in Rift Valley Province on the early weaning of calves. At Eldoret the Red Poll calves, weaned off milk to a special meal at three weeks of age, appeared to save Sh. 18/90 per calf, compared with those reared by normal methods. This saving does not include economies in labour and management attributable to the early weaning system. Results at Kitale with Jersey calves were disappointing due to the calves' appetite for the meal. The trials continue with various modifications to limit intake of meal to an economic level.

Pigs.—The third and final phase of the Eldoret indoor-outdoor pig trial has now been completed. Interim results show that downgrading was the first cause of low profits, followed by poor conversion ratios. Other findings show that pigs fed *ad lib* mature for bacon 1-2 weeks earlier, have poorer conversion ratios and are less profitable. Pigs reared outdoors mature for bacon some 2-3 weeks earlier.

Another trial on pigs at Eldoret proved the value of skim milk as the protein part of the diet. In this same trial amino-acid deficiencies were induced when the pigs were fed on normal farm rations of meat meal and cereals. Efforts are being made, in association with the East African Agriculture and Forestry Research Organization, to correct the amino-acid balance of the rations.

The pig trial at Kitale on the feeding of high levels of maize and skim milk created widespread interest and proved conclusively that maize is, indeed, a useful pig feed when used with skim milk. Trials continue in an effort to find alternative proteins to skim milk for feeding with high-maize rations.

Sheep.—A trial at Eldoret with Hampshire cross native lambs showed that fat lamb production is not feasible, under Eldoret conditions, off ley or rape, without supplementary feeding. Although the clover-ley fed group made better liveweight gains the rape fed group was more acceptable to the butchers as the gains in this group were more in meat and less in frame. The conclusion from this trial is that unless grazing can be improved the sheep should be sold as Highland mutton instead of lamb.

Grassland

Kitale.—Of the 174 new items tested in the plant introduction work, the most promising were Sabi Guinea grass from Rhodesia, Rhodes grass varieties from South Africa, Kenya and Senegal, and also varieties of red clover (*Trifolium pratense*), velvet bean (*Stizolobium*), Berseem clover and *Andropogon gayanus*, the latter a grass from the semi-arid grazing areas of West Africa.

The preliminary grazing trials are for the further evaluation of species which have shown up well in the earlier nursery trials, and are continued for four years. During recent years, 44 varieties of Rhodes grass and 20 of molasses grass were tested in the nursery and then put through the preliminary grazing trials, and in the latter, the following ones showed up the best: Kitale commercial and Chania varieties of molasses grass, and Nzoia, Endebess, Mbarara and Chepararia varieties of Rhodes grass. *Pennisetum dowsonii* and *Panicum coloratum* also performed well in these trials.

Uniformity tests have been carried out with several Rhodes grass varieties by observations on single-spaced plants. A considerable amount of variation has been found within strains and this offers much scope for improvement by means of selection.

Progeny testing indicates that *Cenchrus cilaris* and molasses grass are self-pollinated or apomictic, while Rhodes grass is cross-pollinated.

In a comparison of the leaf yield from seven grass species which were managed for general purpose leys, molasses grass, Rongai Rhodes, and Coloured Guinea grass (*Panicum coloratum*) out-yielded Slender Guinea, Beck grass (*Beckeropsis uniseta*), star grass and Nandi setaria in the first season.

During the dry months of 1957/58 the leaf yield of seven grasses was compared under late (dry) season grazing management. In that period Sigor Guinea grass and molasses grass out-yielded Slender Guinea, Gold Coast elephant grass, Nzoia Rhodes, Giant setaria (*Setaria splendida*) and Columbus grass.

Comparison of *Trifolium semipilosum*, *T. repens* (Louisiana white clover), lucerne and *Trifolium rueppellianum* (Rueppells clover) in grazing mixtures during the last three seasons has shown that the perennial legumes yield more than the annual Rueppells clover under the conditions of this experiment.

Glycine javanica, perennial *Dolichos sp. nr. D. lablab* and *Desmodium uncinatum* are the three legumes which appear to be most satisfactory at present for use in late (dry) season grazing mixtures.

Further evidence of the beneficial effect of legumes on both yield and quality of leys has been obtained. In one experiment yield increases of up to 15 cwt. an acre of dry matter have resulted from the mixture of Kenya white clover, Louisiana white clover and lucerne with Nzoia Rhodes grass.

Observations on the management of general purpose leys, concluded this season, have confirmed that the proportions of grass and Kenya white clover in a mixed sward can be controlled. The clover is encouraged by close mowing and frequent grazing with cattle, and is retarded by the reverse treatment.

Investigations on gypsum to correct sulphur shortage in the soil have been continued. It seems that first-year stands of clover and lucerne often do not give a response, but the effect of gypsum usually becomes apparent in the second year and thereafter. A mixture of grass and clover responds most readily to gypsum treatments, but grass alone hardly responds, while maize so far has not shown any response at all.

Among the minor elements a statistically significant but small response to zinc was obtained on Kenya white clover (*Trifolium semipilosum*) and a number of instances of zinc effect have also been seen on observation plots. Work done so far indicates that some plants are more sensitive than others to zinc shortage.

In ley agronomy work the beneficial effect of inoculation of legumes has been confirmed yet again, in this instance on Clare subterranean clover. The inoculated plots produced a bigger yield per acre of dry matter, better plants and more protein per acre than uninoculated plants.

Last year's indications regarding the difficulty of obtaining efficient nitrogen fixation in legumes on deficient soils have been further supported this year.

The animal agronomy work, which is for the evaluation of pastures by means of meat and milk production, continues. The effect of fertilizers on production is being investigated, and also the relative value of different grass species.

Grass and legume seeds of all the varieties in current use are being multiplied to produce sufficient material both for trials within the Department and stock seed for the Seed Certification Scheme.

The Seed Certification Scheme has now been in operation for a year. Of the farms that have been visited for field inspection, eight have been passed for certification, the crops being: Mbarara Rhodes, 34 acres; Nzoia Rhodes, 35 acres; Nandi setaria, 21 acres; Kenya white clover, 5 acres; Bamenda white clover, 2 acres.

In the Pasture Research Chemist's work, the O.255N—, N—, 2N—, 3N and 6N—H_2SO_4 fibre contents of the feed and of the faeces of star grass, canna tops, meadow hay and the same meadow hay fed with cassava have been examined, together with the crude protein and the true protein associated with the respective acid-fibres.

The N—H_2SO_4 fibre content of lucerne at different stages of its maturity in relation to its conventional crude fibre content has also been investigated.

The sulphur content of star grass in relation to its phosphorus and its nitrogen content has been studied.

The development of the Molo Grassland Research Station is now finished and increased numbers of stock can be carried. Work during the year has shown the need for high phosphate dressings for clover growth. Where this has been provided, beneficial effects of legumes on grass and cereals have been obtained. The effects of trace elements on a soil which shows no overt deficiencies is dependent on adequate phosphate being supplied and on certain interactions between trace elements. The economics of the above effects, particularly in relation to phosphate applications, can be determined only in long-term experiments which the station is now equipped to tackle.

Ranching Areas.—The preliminary work in the ranching areas is now almost completed. The survey of ranching in the European Highlands is finished and a final report on the management, production, animal numbers and pasture problems in those areas has now been written up. Bush invasion has emerged as the major problem of ranching areas.

Preliminary investigations on bush control commenced during the year, and work is going ahead. The preliminary trials have given valuable information on the effectiveness of the various methods and their cost. They have also demonstrated the tenacity and power of regeneration of the East African bush species and difficulties of control.

Katumani Sub-station.—Pasture research at Katumani in the Southern Province expanded rapidly during the year. Rainfall was much higher than average and preliminary results from experiments should, therefore, be treated with caution.

A large number of grasses were on trial under grazing to find productive, palatable and persistent types. Rhodes and *Panicum* varieties in general established easily and quickly and were more productive and palatable than grasses such as *Cenchrus ciliaris* and *Eragrostis superba* during the first year. These grasses are slower to establish but they are, however, more persistent in dry areas. Inadequate seed production and difficulties in establishment prevent their widespread use at present, although they have proved useful in restoring a cover on denuded grazing in certain parts of Ukambani. Attempts to find suitable pasture legumes have been disappointing.

In a comparison of a single cut of silage crops, maize, local sorghum, and perennial Kavirondo sorghum gave similar dry matter yields, whereas bulrush millet and Sudan grass gave about 40 per cent less. However, Sudan grass gives valuable aftermath grazing and the silage cut gave as much crude protein per acre as maize.

In a fertilizer trial on Rhodes grass yields averaged four tons of dry matter per acre. There was no response to fertilizer at the start, but towards the end of the year nitrogen was showing a visible response.

Kamasia Sub-station.—The work of the Kamasia Pasture Research Station at Marigat has progressed well during the year. The main problems receiving attention at present are: (*a*) the rehabilitation of habitually over-grazed areas, both by reseeding and by the introduction of remedial grazing control, including investigations in connexion with grazing schemes; and (*b*) the control of bush encroachment, with particular reference to *Tarconanthus camphoratus* (Leleshwa) and *Acacia* spp.

Ecological survey work, which featured prominently last year, has been limited as a result of the expansion of the experimental programme in other directions. Nevertheless, some time has been devoted to more detailed surveys of land condition and potential, and one report of this nature (for the Seya-Barsalinga area of Samburu) has been released during the year.

Coffee

Entomology.—The two main lines of investigation were the biology and control of the Tip Stem Borer, *Eucosma nereidopa* Meyr., and improved methods of chemical control of the Leaf Miners *Leucoptera meyricki* Ghes. and *Leucoptera caffeina* Wshbn.

Detailed studies of the distribution of the night-flying *Eucosma* moth in the plantation, when at rest during daylight hours were made. Most occurred on the trunks of the coffee and shade trees. Many persistent insecticides were screened to find one suitable for spraying on the tree trunks. Five showed promise. Systemic insecticides against the caterpillars in the sucker tips were disappointing when used at economic rates. Much general information on the life history of this pest was acquired.

Three of the newer insecticides were found to kill *Leucoptera* caterpillars in closed mines, but further field trials are required before they can be recommended as alternatives to Diazinon or Parathion. Pyrethrum, sprayed as an emulsion, gave a good kill of *Leucoptera* eggs at what may prove to be economic concentrations. Further laboratory work in co-operation with the Pyrethrum Board of Kenya is in progress. Heavy overhead irrigation killed (by drowning) almost all the cater-

pillars feeding in open mines—about 25 per cent of the total larval population. Work on the parasite complex continues.

Opportunities were taken to test some of the newer insecticides against the Scale insects *Ceroplastes luteolus* De Lotto, *Saissetia coffeae*, and *Asterolecanium coffeae* Newst. Both Malathion and Parathion gave good control of the Lace Bug *Habrochila ghesquierei* Schout. and one or the other is now in general use against this pest. New pyrethrum formulations gave disappointing results in trials against the Antestia Bug (*Antestiopsis* spp.) but aerial spraying with Malathion was successful.

Chemistry.—Little new work has been undertaken this year with the study of soil nitrogen changes in relation to nitrogenous fertilizers and mulches. A period of consolidation and an appreciation of results obtained to date and their practical application has followed nearly four years of experimentation.

Meanwhile, active work has shifted to a study of some of the catonic constituents in the coffee leaf following preliminary work which described and defined a widespread deficiency or imbalance of magnesium (*Emp. J. exp. Agric, 1958, 26,* 259). The important and indirect part played by grass mulches, particularly Napier grass (*Pennisetum purpureum*), in relation to the occurrence and the severity of magnesium imbalance has been further studied by means of leaf analysis of both mulch grass species and coffee and of coffee cherry and soil analysis. Estate observations, following the inclusion of Epsom salts with routine copper fungicide or other pesticide sprays, have in general confirmed that this practice is beneficial in coffee mulched consistently and/or in heavy bearing, and it remains now for the detailed field trials to supply yield data over a reliable period of time in support, or otherwise, of magnesium fertilizer applications to the soil.

Work has continued on various micro-nutrient investigations of coffee nutrition without so far providing conclusive results. Observations in these trials point to a considerable need for a parallel investigation of the carbohydrate status of the tree with special reference to crop production, i.e. season, physiology, and quantity.

An interesting fact has emerged from a short-term and arbitrary study of root cation exchange capacity conducted on varieties and species of coffee in the museum plots on the Coffee Research Station. The results fall naturally into four quite well defined groups. This requires a follow-up in terms at least of the cation concentrations present in the leaf of variety/species in each group grown on similar soil and under similar climatic conditions.

Pathology and Physiology.—The growth experiments in the Coffee Research Station and Scott Agricultural Laboratories were continued, but the high rainfall for the second year in succession obviated the application of much irrigation. At the Coffee Research Station the single stem trees showed a higher peak of growth in March than the multiple stem, while the reverse was the case at the Scott Agricultural Laboratories. As in the previous year the shaded trees in the Coffee Research Station outstripped the unshaded.

A small test of the gibberellic acid was carried out on mature multiple stem coffee trees, but it appeared that this material had no effect in such circumstances.

Germination tests of *Hemileia vastatrix* showed that spores kept in subdued light retain their viability as well as those stored in darkness, and they can also germinate in the same subdued light. This could have important consequences where there is heavy shade.

In spite of repeated inoculations, it has still been impossible to isolate the Race VII of *Hemileia vastatrix* named by Dr. 'Oliveira. Three separate collections from the same source have been tested with no success.

The timing of sprays experiment showed that, of the four applications, that taking place in January could be omitted where the rust infection was at a low level and there was a dry period from January to March. The control effected by each spray lasted in the region of three to four months, but much depended on the level of infection present when the fungicide was applied. The higher concentration, i.e. 10 lb. of Perenox per 100 gallons of water proved to have proportionately greater control of infection and the effect lasted considerably longer.

In conjunction with the Agricultural Officer (Experiments) various machines were tested for leaf cover in comparison with the Eclypse Warley, by means of leaf prints obtained with rubeanic acid.

There have been many queries concerning fungicides, spraying, and root and seedling diseases as the abnormally wet conditions have favoured fungus diseases as a whole.

Coffee Berry Disease.—Trials in both the East and West Rift districts have fully confirmed the results of the previous seasons' field work. It is now quite certain that effective control of the disease is possible at an economic level in both East and West Rift districts. The response to treatment varies with the crop and it is now possible to assess the most probable financial return for any given flowering-rate.

In the East Rift it has been conclusively shown that the critical period for control is the 11 weeks centred on the flowering period. This period needs detailed study and field experiments on this have been designed and completed. Results are now coming in. In the West Rift, the necessity for two control periods has been confirmed. Extensive trials for the further study of these are complete; but results are not yet available.

During the year, the use of mercurial sprays has been abandoned, partly because of their poisonous nature and partly because of their phytotoxic effect. Captan formulations, which this year's comparative trials have shown to be effective, are now used.

A severe outbreak of Leaf Rust on one field trial has enabled observations on the effects of Captan to be made. These are most encouraging; it is clear that the fungicide has affected not merely the rust fungus but the syndrome.

Laboratory work has concentrated on the relationship between disease incidence and inoculum potential. It has been shown that the infection potential of a plantation is in the main the result of inoculum production on the maturing twigs and not from the fruit, and that control treatments, in all probability are efficacious in that they affect this source of infection. This discovery is in complete accord with all field evidence and epidemiological studies and will, it is hoped, form the theoretical basis on which spray schedules will, in future, be determined. Studies on the relationship between infection-potential, infection, and growth characteristics, as affected by fungicidal sprays, are in hand.

Vegetative Propagation.—Electrical soil-warming equipment was installed in three frames with the object of shortening the time required to produce rooted coffee cuttings. Preliminary results indicate that the time taken for rooting may be reduced by about two weeks only and that internodal cuttings will produce roots more quickly than nodal cuttings in a constant temperature of 72° F.

In a trial of composts for coffee cuttings two types of Vermiculite were tested in various combinations with coffee hulls, coarse sand and Kikuyu red loam soil. The results obtained to date indicate that a mixture of 1/4 Vermiculite, 1/4 coffee hulls and 1/2 coarse sand gave the best results.

Field Trials.—The mulch trial at the Coffee Research Station, Ruiru: there was a valuable yield response to all mulch treatments applied. In this trial the use of magnesium as fertilizer has not affected the yield of coffee during the two years it has been applied. On other trials at Ruiru and Kitale mulches did not increase coffee yields in 1958.

Treatments with cattle manure and a phosphate fertilizer did not increase the yield of coffee and with one exception nitrogenous fertilizers were not effective in improving the crop. In a trial comparing the efficiency of urea applied to the ground at rates of up to 200 lb. per acre or to the leaves in high or low volume sprays at rates of up to 100 lb. per acre all treatments improved yields substantially and there was little difference in the efficiency of the various methods employed to apply the fertilizer.

The trials at Kitale and Makuyu continue to indicate that May is the best month in which to apply a copper spray to reduce leaf-fall.

In another spray trial to reduce leaf-fall at the Coffee Research Station, Ruiru, the "Micron" very low volume (10 g.p.a.) sprayer was compared with a medium volume (60 g.p.a.) airblast machine. Yield results from the first two years have indicated that if the spray volume per acre is reduced from 60 to 10 g.p.a. the concentration of fungicide (50 per cent copper oxide formulation) does not need to be increased to obtain the same yield response; however, yield responses have increased with the concentration of spray employed up to 34 lb. per 100 gallons when it is applied with the "Micron" sprayer.

The variety trials planted at Kitale and on Kentmere Estate, Upper Kiambu, in 1954, carried their first full crop in 1958, and it appears that the selections S.L.34 and S.L.28 have out-yielded all the Blue Mountain selections at both sites.

Towards the end of the year 24 valuable coffee plants were obtained from Rust Research Centre, Lisbon, Portugal. It is hoped that this material will eventually enable the Coffee Research Services to provide seed of selections resistant to all races of Leaf Rust in East Africa.

Trials in African Areas.—Above 5,000 ft. in Meru and Embu the varieties S.L.28 and S.L.34 continued to produce excellent crops of good quality coffee. The variety Meru Kents is being superseded by S.L.28 and S.L.34 in both districts.

In Fort Hall the variety S.L.6 continued to show resistance to Leaf Rust and will be planted commercially as an alternative variety to K.7 in the Leaf Rust (*Hemileia vastatrix*) endemic zones of Central and Nyanza Provinces. The performance of K.7 in Elgon Nyanza was outstanding when compared with the varieties S.L.2, S.L.14, S.L.28 and S.L.34, and Kapretwa series A. In Nyanza Province below 5,400 ft., the chief limiting factor to production was Leaf Rust.

Preliminary results from the rust exposure trials planted in 1956 indicate that S.288 and S.795 are completely immune to Races I and II of *Hemileia vastatrix*. Information on their crop potential and liquoring quality should be obtained during 1959.

The yields produced by the variety Blue Mountain have been disappointingly low; the trees do not grow with vigour in the Central and Southern Provinces. In exposed situations the best resistance to "hot and cold" was shown by the variety S.L.34.

Pyrethrum

Breeding.—586 new single plant selections were made and 19 new hybrids (crosses) produced on the various stations. Varieties were tested in 20 yield trials. New seed production fields were established for C. 34, C. 92, M.9, M.21, O.4 and the two sugar beet breeding systems at Molo and Subukia. Over 2,000 lb. of seed were supplied to the Pyrethrum Board.

Pests and Diseases.—Ramularia bud disease was not very common, but during the cloudy and wet periods of July and August physiological ("false") bud disease was frequently observed. Thrips attacking the foliage caused considerable damage.

Fertilizers.—Sixteen trials, distributed over most of the pyrethrum-growing areas again confirmed a close relationship between the base exchange capacity of the soil and the efficacy of phosphatic fertilizers. The action of lime is not so well defined.

Other Work.—This included a stripping trial, an irrigation trial, eelworm control in the nursery and a rotation experiment.

Sisal

Nurseries.—The feasibility of growing successive crops of satisfactory nursery plants on the same site by applications of sisal waste and nitrogenous fertilizer has been demonstrated.

The trial comparing old and young suckers and nursery plants has been completed. There was little difference between nursery plants and old suckers, but young suckers, being smaller, took longer to produce their fibre yield. A strict grading of suckers would be needed to obtain evenly-sized planting material.

Plant Management.—The annual rate of leaf production has been shown to be far from constant. After an initial six months of establishment the maximum number of leaves is produced in the following three years, about 30-40 leaves per annum. After that the number is reduced by about five per annum, until poling begins when the plant ceases to produce new leaves.

Fertilizers.—Samples from the main sisal areas have shown nitrogen to be deficient in all cases. This fact ties up with the responses to nitrogen in all fertilizer trials. Most soils also showed a phosphate deficiency but only small and transient responses to phosphate fertilizers have been found. Substantial responses in yield of sisal resulted from sisal waste applications and improvement in the top-soil has been marked as shown by sampling.

Other Work.—Herbicide work continued. One of the main objects now is to find a cheap control of annual grasses. Some promising leguminous cover-crops have been obtained. Observation plots of grasses for intersowing in sisal for grazing trials were continued.

Sugar Cane

In sugar cane variety trials in Nyanza Province B.41227 has been found the most satisfactory variety under irrigation. B.41211 also did well. Under rain-fed conditions B.37193 proved a good variety and in another trial which has completed its first ratoon NCo.339 leads over 24 other varieties. Gypsum and soil-ripping treatments have given good results on poor soils with impeded drainage. Three cwt. of sulphate of ammonia applied in the Short Rains under trash gave the best increases in yield in a fertilizer trial on ratoon cane. Deep planting of cane at Kakamega proved very beneficial under dry establishment conditions.

Horticulture

Marketing.—Considerable progress was made with air export trials of fresh horticultural produce. An efficient organization is now in existence for carrying out work of this nature. It is unfortunate, however, that after initial trials have proved that export of a particular crop is a commercial possibility, a considerable period usually elapses before regular consignments are started. Prices for horticultural produce on the local market have dropped during the year, and are now at a more realistic level.

Tree Crops.—Investigations were started into the possibility of developing an export industry for citrus juice. There appears to be a market in the United Kingdom for a considerable quantity of lemon juice, and a smaller quantity of lime juice. It is expected that a decision will be possible during 1959 on the likelihood of success of such an export industry.

The Kenya Citrus Growers' Association is finding a considerable demand for its fruit and new acreage is being planted. A serious problem in East Nyanza is poor colour in oranges; investigations are being made to combat this.

Trial exports of avocados to Aden and litchi to London have been successful, but insufficient fruit was available to maintain supplies. The Fuerte avocado is the type required for export.

Exports of Malindi mangoes continued successfully, but owing to lack of packing and grading facilities, they continue to be on much too small a scale.

Pineapples.—Comparisons of planting material at Jacaranda showed that suckers gave a significant increase in yield and earlier fruiting of the plant crop over both crowns and slips.

The drying out of crowns and slips for periods up to two months before planting, or a pre-planting dip containing an organo mercury fungicide, had no effect on the rate of establishment or fruit yield compared with freshly planted material. These pre-planting treatments may be of value under poor drainage conditions where basal-rot is prevalent.

Berry Fruits.—Export trials of strawberries to the London market in the Christmas period were successful. However, much of the fruit was produced too far up-country, and it would be more satisfactory if production were zoned in the Limuru-Uplands-Bamboo Forest area. Several new trials with strawberries were started at Molo. Mass selection of seedlings, with the object of producing varieties suited to local conditions, is continuing.

Export trials with Cape gooseberries from Molo were extremely successful. However, this can only be a small trade.

Asparagus.—The second year results of the asparagus season-of-cutting trial at Molo again show that the heaviest yields are obtained from December to March, when soil temperatures are highest. However, the October-November period which previously has given the second highest yield was much lower this year due to unseasonable weather conditions. It is probable that better yields would be obtained if cutting periods were determined by soil temperature rather than by date.

Tomatoes.—Tomatoes grown for canning in the Trans Nzoia, Nakuru and Naivasha districts gave reasonable yields. Good results were obtained from a trial at the Irrigation Research Station, Mwea/Tebere. Eight varieties yielded at between 10 and 14 tons per acre. Ariana and Stokescross varieties were outstanding. At Thika, the most promising varieties in a trial of 14 which were tested for the fresh market were Hundredfold Amateur, German Strain Nos. 7 and 8, and Homestead.

Hops.—Seed is being imported from many parts of the world, and mass selection will be carried out on the resultant seedlings, in order to get varieties which will grow normally in a 12-hour day length.

Plant Pathology

Plant Diseases.—A record number of 526 plant pathological specimens were examined in the laboratories. The discovery of Sugar Cane Smut (*Ustilago scitaminea*) was the outstanding event of the year. Bacterial Wilt of Potatoes (*Pseudomonas solanacearum*) appears to be spreading in Kenya and threatens to be a difficult problem to the expanding potato industry. Barley leaf diseases caused by *Helminthosporium teres* (Net Blotch), *H. sativum* (Spot Blotch) and *Rhynchosporium secalis* (Scald) were serious and formed the subject of a special survey. It was concluded that recent weather conditions were primarily responsible for the severity of these normally unimportant diseases. *Pyrenophora triticirepentis* and *Septoria* spp. were serious on some wheat crops. Again, these diseases are normally of little importance and their severity was attributed to wet weather. Head Smut (*Sphacelotheca reiliana*) of maize was abnormally damaging. Maize White Blight (*Helminthosporium turcicum*) threatents to become the most damaging of all the Kenya maize diseases.

Legume Bacteriology.—281 orders for a total of over 1,200 units of inoculant were received during the year. There has been a very significant change in demand away from lupins in favour of indigenous clovers. Staff difficulties remain acute preventing progress in research.

Seed Testing.—Nearly every year since the seed laboratory opened has been a record year and 1958 was no exception with 2,800 samples tested. Little research work was possible owing to the staff shortage.

Potato Work.—The creation of a new post of Assistant Agricultural Officer (Potatoes) has greatly assisted this work. The seed certification scheme began to operate during 1958. Importation and testing of new varieties continued.

Entomology

Work continued on the taxonomy of Coccids and a monograph on the genus Ceroplastes from Africa South of the Sahara was under preparation.

In an experiment against Bean Fly almost complete protection was given to beans in early growth by the use of seed dressings. Aldrin was better than dieldrin or gamma B.H.C.

In pyrethrum, red spider mite was controlled by Rogor, Kelthane and Tedion while control of thrips was given by D.D.T., Chlorthion, Metasystox and Rogor. A new sampling technique, involving the use of a benzene-water interface, has given good results and increased the efficiency and speed of examining samples.

The Cochineal insect, *Dactylopius tomentosus,* established itself on prickly pear, liberations being made in Nairobi, Mariakani, Naivasha and Muhoru. The lacebug, *Teleonemia scropulosa,* was liberated in Nyanza to attack lantana. The lantana seed fly, *Agromyza lantanae,* was established in Nairobi and in the Fort Hall area.

At the Coast laboratory testing of insecticides against the Coconut Coreid bug, *Pseudotheraptus wayi,* continued and the most promising insecticides are being further tested in field trials. Experiments to find economic control measures of cotton pests are being undertaken, and a study of the pests of the castor bean crop was made. Spraying regularly over the flowering period increased castor yields substantially.

Work in Nyanza was concerned chiefly with cotton pests. In the lake shore area figures so far received show yields increased from 290 lb. per acre seed cotton (50 per cent stained) to 700 lb. per acre (20 per cent stained) due to dusting with 60 or 80 lb. per acre of B.H.C./D.D.T. cotton dust.

Work on the aphid vectors of passion fruit woodiness disease was intensified. Aphids of several species were found feeding on passion fruit at Sotik. Experiments on pest control in citrus, tea, sweet potatoes and bananas were also carried out.

Experiments with dry seed dressings to control Barley Fly showed that dieldrin and heptachlor were better than aldrin or endrin. Thiodan and thiometon were ineffective. A dieldrin spray applied three days after emergence of the coloptile gave better control than seed dressings (10 oz. of 50 per cent to 100 lb. of seed) was found superior to lower levels of dosage. Nandi setaria at Nakuru was found to be an alternative host of the fly.

A trial at Kitale showed that endrin and dieldrin granules and aldrin and dieldrin dusts gave effective control of Maize Stalk borer.

Several heavy infestations of *Nematocerus* caused damage in the Naro Moru and Moyo ridge areas. Little success has been achieved with seed dressings though thimeton, heptachlor and dieldrin gave promising results at the end of the year.

The bulk of stored products work was related to stack fumigations with methyl bromide gas. Fumigation and long-term storage under polyethylene sheeting was the most promising development of the year. At the Coast a stored products entomologist found that a rapid reinfestation of *Tribolium castaneum* occurs following fumigation of maize. Work on dusting large stacks of maize with 0.5 per cent gamma B.H.C. resulted in a more refined technique. Several trials were directed at the control of moths in large maize stores. A fumigation of a store rendered gastight by sealing all openings was most promising. A search of the port and the other parts of Mombasa was undertaken to find *Trogoderma granarium*. No established centre of infestation was found.

Soil and Agricultural Chemistry

During the year the soil survey team, working in Kenya under I.C.A. auspices, completed the field work of a semi-detailed survey of 130,000 acres in the North Eastern Kano Plains and the surrounding rising country. The survey was undertaken in connexion with a proposal to develop cane sugar locally. Between one and three phases each of 42 different soil types were described and mapped, mapping being on a scale of 1 : 50,000 to match the Survey of Kenya physical maps. The various soil types described were also assessed for their suitability for sugar production and on this basis a further map was prepared delineating the areas of varying suitability for sugar cane growing. Forty-five profiles were taken for laboratory analysis.

Subsequently, a start was made on a similar survey of equal magnitude in South Nyanza. This latter survey was greatly facilitated by having a new set of aerial photographs taken of the area specially for the survey. The use of special infra red sensitive equipment gave an additional clarity to the pictures so far as soil recognition was concerned.

Dr. Thorp, the head of the I.C.A. team, travelled widely in the Colony collecting information on local soils with a view to advising on a framework within which a classification scheme for Kenya soils can be developed.

Other pilot surveys were undertaken in collaboration with the Farm Planning Officer in Nakuru District. These involved the delineation of the land units making up each of four 700-acre farms, and subdividing these into sampling units from which random samples are drawn for analysis, which is now under way.

Dr. Mehlich pressed on with the introduction of the rapid routine procedures which during 1957 he had tested and found suitable for Kenya conditions. He built up an organization capable of handling 70 samples a day and determining chemically, or physico-chemically, pH and acid extractable sodium, potassium, calcium, magnesium, manganese and phosphorus. About 24 topsoil samples per day were examined by use of the Cunninghamella organism for available nitrogen, phosphorus, sulphur and trace elements, while with samples in which indications were obtained of trace element deficiency further tests were undertaken to identify the deficient nutrient. The survey profile samples were also examined chemically with a view to the characterization of the soil colloids present in the various horizons, following a procedure which Dr. Mehlich developed for the approximate determination of expanding lattice, kaolinitic and sesquioxidic materials. The clay characterization data which he so obtained has given the field surveyors notably increased confidence in their classification of the soils on which they have been working.

Parallel to the Mehlich analyses investigation of the nutrient status of carefully selected soils using the Webb Hewitt technique and *Aspergillus niger* cultures was continued, 32 soils being examined in the course of the year. The most widespread and serious deficiencies revealed were those of phosphorus and nitrogen. Sulphur deficiency was common, all samples from Trans Nzoia and the East Kano survey area being deficient or extremely deficient. Copper deficiency was found in four samples from areas of the Rift Valley where low copper status is known from farming experience. Examinations of a number of soils from the East Rift plateau suggested the incidence of sporadic deficiencies in molybdenum.

Comparison of pot tests with *Aspergillus* indications suggested that some correlation exists so far as copper is concerned but that the present pot test technique is insensitive to zinc deficiency: Comparisons between the pot test and Cunninghamella results established a good correlation for nitrogen, phosphorus and sulphur but not for copper: available data remains insufficient for similar testing so far as other trace elements are concerned.

The African fertilizer trials programme was maintained, a good proportion of the trials being run into residuals. The application of superphosphate and F.Y.M. to English potatoes had pronounced residual effects in the main rains maize crop in the succeeding year in responding areas. But the residual effect in the reverse order of cropping was decidedly less. The relationship described in 1957 between N and P responses and certain soil characteristics have been confirmed and elaborated. In particular a highly significant correlation was established between the phosphate response of English potatoes on red soils of volcanic origin in Central Province and the Mehlich determined acid soluble phosphorus of the unfertilized soil.

The lime investigations continued with a switch in cropping from cereals to grass/legume leys and row crops. Sugar beet at Kaptagat failed but kale at South Kinangop did well and showed the normal responses. Newly established ley at Eldoret and Marindas got away satisfactorily and responded better to the lime treatments than the preceding crops of cereals. Associated laboratory work revealed a marked accumulation of extractable phosphorus as a result of the repeated phosphate application at South Kinangop but not elsewhere. Here much

of the phosphate present or added to the soil is held as aluminium phosphate and relatively little as occluded ferric phosphate. Elsewhere this latter is the main form in which phosphate is held by the soil. A low sulphur status is apparent at South Kinangop on those plots which have received no sulphate of ammonia.

In the wheat quality investigations glutens were isolated from a diversity of wheats and stabilized by vacuum freeze drying. Exhaustive attempts were made and are being continued to apply electrophoresis to the fractionation of the constituent proteins and in particular to find a medium in which these are adequately mobile. In the field, the long-term effects of environment and grain size, the effect of past cropping history and the immediate effect of harvest conditions remained under investigation. The soil fertility background of a number of instances of exceptionally strong and exceptionally weak commercial wheats have also been examined. Results continue to be inconclusive. Nitrogen fertilizing of wheat has been so ineffective in improving quality that its investigation has been discontinued.

Locally produced citrus juice, Reunion geranium oil and Mexican marigold oil samples and a variety of other products of possible economic value were prepared, examined and submitted to the Tropical Products Institute.

Plant Breeding

Wheat.—The season was a poor one due to prolonged rains and lack of sunshine. In consequence, yields were about average except in the higher areas where conditions were more favourable. There has been less stem rust than usual, but on the other hand brown leaf rust was widespread and very damaging in its attacks. The premium wheats, principally Canadian varieties, were severely attacked and yields reduced markedly in consequence. The chief races of stem rust present during the season were K.18 and K.19, but K.12, K.14 and K.16 were also damaging and, in fact, K.12 has shown a remarkable revival. A new race (K.20) is suspected.

Practically the entire multiplication programme is still devoted to introductions to bridge the gap until new resistant Kenya-bred material can be made available. In breeding work the new intensive back-cross programme was begun, based on 183 rust-resistant introductions and five established Kenya varieties.

The following seven new varieties were released during the year: RL 2150/A, 362.B.1.A.2, 367.AR, 367, BR, 339, H.462 and a new Sabanero selection. Three promising new varieties had to be withdrawn due to stem rust attack—Spica, Rio Negro and Frontana-Kenya 58—Newthatch (II-50-25). The only remaining variety in farm scale multiplication, Mentana^2 × Kenya C9906 is doubtful.

Barley.—Crosses made in 1953 reached the final selection stage and were screened for leaf disease resistance. Material from the World Barley collections has been introduced to find field resistance to leaf diseases which have been particularly damaging in the past two years. The new variety Mid-Season Research was released.

Maize.—At Njoro, the main activity was the formation of Synthetic II, and work continues to produce further improved varieties. At Kitale, the combined Hybrid and Synthetic programme consisted of the final screening of material derived from the old work, and more importantly, much new material dating from the start of the new programme two seasons ago. Ecological trials to assess the need for separate programmes in different areas and to identify the best stocks for breeding purposes have been laid down. Such trials have offered the opportunity for a general comparison of the synthetics developed at Njoro and Kitale and also those developed by E.A.A.F.R.O. at Eldoret. Kitale Synthetic I was released during the year and had moderate success.

In the work for the drier areas at Machakos, the most important aspect has been the bulking of the short-season variety Taboran. In breeding work, Taboran crosses show considerable promise in combining earliness with good yield.

On the coast, the first field bulking of the stock resistant to tropical maize rust was carried out on the Irrigation Scheme at Hola in the Tana River delta. This maize showed 99 per cent resistance to the disease in the field.

Irrigation

Hola.—On the red desert soils at Hola, fertilizers have proved more effective than leaching or gypsum applications in improving crop growth and, of the fertilizers, nitrogen has proved the most effective. In observation plots finger millet, bulrush millet, several fodder grasses, most legumes, jute, sunflowers, cotton and cassava grew and yielded well. Several economic tree crops have been established successfully. The position regarding cotton varieties suitable to Hola is not yet clear but UK.51 has yielded well, giving an average of 2,264 lb. seed cotton per acre in one trial.

The growing and incorporation of a green manure crop on the grey desert soils produces striking results and, where this has been done, satisfactory growth and yields of cotton and even maize have been recorded. Where green manure is supplemented by cambered beds, cotton yields appear to increase the longer the land is intensively cropped. Swamp rice yields well on the grey soils. Sunflowers, cowpeas and pigeon peas have also grown well on the grey soils.

Irrigation Research Station, Mwea.—The rice collection was enlarged by the addition of new varieties from Persia, Nyasaland and Surinam and by the end of the year numbered 84 varieties. Fertilizer experiments on the variety Sindano showed fairly general responses to 1 cwt. per acre of both double superphosphate and sulphate of ammonia applied just before transplanting. Applying the latter fertilizer as a top dressing three weeks or nine weeks after transplanting or splitting the dressing between all three times showed no advantage. Work on spacing showed that 6 in. × 6 in. usually gave a higher yield than wider spacings. Measurement of the water requirements of rice continued.

Observation plots were continued of a number of alternative crops on the black soil, both irrigated and unirrigated. A new aspect of this work was an investigation into fish, *Tilapia nigra,* as an alternative "crop".

On the red soils, work was done on irrigation methods suitable for land with a very thin topsoil and unusually high permeability; on possible irrigated cash crops for the red soil; and on crop growth and manuring on unirrigated land. So far, the most promising irrigated cash crops are hibiscus fibre, tomatoes, asparagus, lucerne, sugar cane, melons and cucumbers.

Agricultural Machinery Testing

The East African Tractor and Implement Testing Unit, based at Nakuru, continued to operate as two sections, tractor testing and implement testing, in 1958.

A—Tractor Section

(1) *Farm Trials.*—One manufacturer entered one of his models for an East African Farm Trials test. Five tractors have been started on the test; one in Uganda, one in Tanganyika and three in Kenya. These five tractors should have completed their tests by late 1959 or early 1960.

(2) *Altitude Investigation.*—Two tests were satisfactorily concluded during the year and one was abandoned pending modification by the manufacturer. A further test is nearing completion.

(3) *Standard Altitude Tests.*—Two tractors were entered for this test during the year and a start was made on them during December. The tests are designed with publication in mind, and 1959 should see two or three East African tractor test reports on sale to the public.

(4) *Uganda Government.*—The four different tractors being tested at Serere at the request of the Government of Uganda were retested in December, and an interim report is in preparation.

(5) *Special Tractor.*—The tractor specially modified for East African conditions by the Special Development Section of the Uganda Department of Agriculture, was tested in February and is currently under observation.

(6) *Cooling Problems.*—One manufacturer was assisted in ascertaining the best modifications to overcome overheating problems on one of his models.

(7) *Fuel Filter Tests.*—These tests were satisfactorily concluded during the year. Considerable knowledge was gained during this test.

(8) *Survey.*—A trial survey covering tractors in East Africa was concluded. This information will be used to design a more comprehensive one, tentatively scheduled to be started in late 1959.

(9) *Light Tractor.*—On behalf of the Kenya Department of Agriculture, a light tractor was borrowed from the prospective agents and tested at Nakuru. The tractor was then passed to the District Agricultural Officer, Nyeri, for further trials on African holdings.

(10) *General.*—Seven various tractors were performance tested at Namalere, Uganda, for the Special Development Section of the Uganda Department of Agriculture.

Dust work has had to be curtailed due to lack of time and staff.

B—Implement Section

(1) Work was continued on the testing of various machines in light bush clearing, and on grassland improvement. The machines consisted of rotary cutters of both knife and chain type, crushers and a flail model.

(2) Test reports have been published on:—

(*a*) Holt Mark VIIIb Bracken Breaker.

(*b*) Holt Mark IXa Bush Breaker.

(3) The following machines have also been tested during the year, and reports will be published early in 1959:—

(*a*) Wilder Nulti-Masta.

(*b*) Wolseley Super Swipe.

(4) Tests have been carried out on the following, but reports have been confidential to the N.I.A.E. or manufacturer:—

(*a*) Arthur Rotary Chain Slasher.

(*b*) Howard Straw Shredder.

(*c*) Ransome Groundnut Harvester.

(*d*) N.I.A.E. Tropical Cultivation Equipment.

(*e*) Simms Inertia Starter.

PART III—FIELD SERVICES

Progress in Improved Farming

European Areas

There has been a visible improvement in farming methods in the mixed farming areas of the Highlands in recent years. This improvement is not so evident on the crop side where yields have not noticeably increased but rather on the animal husbandry side with a much increased seeding of grass leys, better grazing management and increased stocking rates. The demand for farm planning continued to be heavy and the Department was unable to satisfy this demand during the year.

During the year, 91 farmers took up Development Loans totalling £104,369. The following figures provided by the Board of Agriculture indicate the purposes for which the money was allocated:—

	£
Purchase of cattle	44,147
Purchase of sheep	14,940
Purchase of pigs	2,130
Water supplies	2,870
Dips and sprays	1,225
Fencing	1,460
Farm buildings	1,950
Machinery	31,472
Various	4,175
TOTAL ..	104,369

The heavy drop in loan issues compared with 1957 was due very largely to the high rates of interest prevailing in 1958.

Asian Areas

In Nyanza the sugar advisory service of the Department has played its part in the improvement of general standards of cultivation among Asian sugar farmers where the use of more productive canes, fertilizers and farm machinery is on the increase. The Miwani Sugar Estates have increased their yields considerably with the use of irrigation, gypsum and deeper cultivations.

At the Coast the market gardeners surrounding Mombasa who produce under irrigation have been as active as ever using large quantities of manure from the native lands which would otherwise deteriorate in the *bomas*.

African Areas

Nyanza Province.—The most important development during the year has been the remarkable change for the better in the attitude of the people of Central Nyanza in regard to agricultural development, particularly land enclosure and consolidation. Land enclosure and exchange are now in evidence in almost every location and there is some anxiety whether agricultural staff will be adequate to provide the necessary follow-up. Land enclosure and consolidation is also proceeding in the western locations of Elgon Nyanza, in North Nyanza slowly, and in the Kisii Highlands and the Kipsigis Reserve, where it mainly involves enclosure. The row planting of crops with placement manuring has gone ahead in most districts of the Province together with the building of cattle sheds (8,875 sheds in 1958 compared with 3,443 in 1957). Farm planning and the simpler form of farm layout was extended to a further 62,000 acres during the year, the latter finding ready acceptance because of its simplicity.

There was a general tightening up on loans to individual farmers. Only Elgon Nyanza and Kericho districts made loans during the year. Joint loan boards were constituted in all districts of the Province. ALDEV loans were made to co-operative societies for coffee factories and for jaggery factory transport and to the Nyanza Tea and Sugar Boards for development of these crops.

Mechanization is proceeding slowly and while tractor maintenance is improving, owners have yet to learn to put part of their takings aside for repairs and replacement. Tractors are sometimes idle for months while the owner tries to raise funds for the necessary repairs. At the end of the year there were 43 tractors in th Province compared with 41 the previous year. A number of Asian and European contractors have been ploughing by contract, but the proportion of mechanical cultivation throughout the African areas of the Province is still small.

The use of fertilizers in the Province has made little headway largely owing to the fall in maize prices.

Rift Valley Province.—The planning of the African areas of high potential on a skeletal Soil Conservation layout has continued during the year. Approximately 34,000 acres have been dealt with on these lines in Elgeyo District and development work has started on another 50,000 acres. Within these planned areas the Elgeyo themselves have carried out a general reorganization of boundaries. Similar work is proceeding though on a smaller scale in the Nandi, West Suk and Baringo districts. Water development has continued in the form of dams and hafirs in the lower country and spring protection and wells in the higher country. Farm planning on formal lines has not been enthusiastically received except in West Suk where some 1,700 acres have already been planned with encouraging results. Increasing interest is being shown in cash crops, particularly tea, coffee and pyrethrum. Stock sales, however, remain the most important source of income and, in 1958, 49,159 cattle were sold from the Baringo, Elgeyo and Nandi districts.

Central Province.—1958 was another year of very good progress in the consolidation and demarcation of individual holdings. This work was completed in Kiambu District during the year. Demarcation has now been completed on a total of 779,547 acres, including settlement schemes, out of a total of 999,397 acres dealt with in the process of fragment measuring. There are now 1,593 planned farms in the Province covering 17,687 acres with more simple farm layouts covering 3,850 holdings on 24,112 acres.

The demonstration of a farm tractor unit in Embu District has resulted in three Africans purchasing tractors during the year and undertaking contract ploughing. There are similar units owned in some cases by Africans and in others by the African District Council in Meru and Kiambu Districts.

Southern Province.—Voluntary land consolidation has made progress in the Kangundo Location of Machakos District where 582 holdings have been consolidated. Although the building of cattle sheds was not as great in some areas, the use of manure increased everywhere with satisfactory results. Exploratory fertilizer trials led to the importation of fertilizers, mainly nitrogen and phosphate on a field scale. More timely planting increased manuring and pest control both in the field and in the store, the planting of fodder crops and grasses and greater attention to stock improvement and management were the main features of the year. The farm survey and planning team operated throughout the year and small numbers of holdings, 12 in each district, were started on organized lines. In the limited arable areas of Masai a noticeable desire for agricultural betterment became apparent with a keen interest in the prospects of cash crop development.

Coast Province.—Voluntary land consolidation continued to make progress in the Taita Hills, and at the end of the year 109 holdings covering 742 acres had been surveyed, of which 71 holdings had been farm planned covering 476 acres. Progress with coconut improvement continued and a total of 12 sq. miles was worked in Kwale and Kilifi districts. Over 80,000 seedlings were issued to fill in plantations and replace unproductive palms. In the Kwale District 1,738 acres were interplanted with cashew nut to support the *Maji Moto* Ant which preys on the Theraptus bug. Due to lack of response on Lamu Island, nursery facilities were withdrawn. The cotton growers, responding to extension advice, increased their pure stand plantings and many tried separate picking of A and B qualities.

Reconditioning, Resettlement and Development Schemes

Nyanza Province

Lambwe Valley.—The failure of the South Nyanza Luo to show any real desire to settle on this scheme has resulted in a reduction in expenditure on it and supervision has reverted to the district staff as part of their normal duties.

Kimulot Scheme.—Of the 251 farms on this scheme, 125 have tea planted and 160 are enclosed by stock-proof hedges. There are 1,989 cattle and 2,625 sheep and goats on the scheme. Fifty-two individuals have taken out loans. The spraying of cattle and planting of hedges and cash crops has made good progress in the year.

Itembe Scheme.—Satisfactory progress was made during the year. 312 farms have now been allocated. Seventy-five settlers sold cream to the Sotik creamery receiving approximately Sh. 1,700 monthly between them.

Kibos-Awach Scheme.—Soil conservation work was continued during the year and a number of blocks have been completed.

Central Province

Meru Settlement Schemes.—Widespread progress has been recorded in the numerous schemes in operation in this district. The farms allocated vary in size from eight to 20 acres. Dairying, potatoes, maize, pigs, sheep and goats are the main sources of income. On the Kimbo-Kiberichia scheme some 30 high-grade Guernseys are producing over two gallons of milk each daily. Particularly good progress has been made at Giaki where the majority of holdings were row planted and very well weeded.

Embu Settlement Scheme.—This embraces the Molinduko and Gichugu areas, settlement being completed by the end of the year with a total of 430 farms enclosed with sisal hedging. A steady improvement in the standard of farming has taken place. 82 farms have been planned with a further 49 having received a simple farm layout.

Kanja Pilot Dairy Scheme.—This scheme has continued to provide information on the High Bracken Zone in the Embu District. With annual manurial dressings the Blue Mountain coffee is now beginning to yield well and tea has been planted during the year by farmers on the scheme as an alternative cash crop. The Corriedale sheep flock has continued to thrive.

Ishiara.—Over the last two years good rainfall in the neighbourhood of this scheme, which in the past has been a famine relief area, has resulted in a declining interest in food crops and a strong desire for a much increased cash crop acreage. However, a fair proportion of farmers harvested good crops. A considerable amount of work by settlers on a group basis was carried out in the cleaning of water channels on the 72 acres of irrigated land.

Southern Province

Machakos District Reconditioning Scheme.—The work of this scheme is gradually being absorbed into the normal duties of the district staff. The African staff employed are being absorbed into Departmental establishments although it was necessary for the scheme to reimburse part of their wages. The mechanical unit has been disbanded, having completed its task in the district.

Makueni Settlement Scheme.—Bush regeneration continued to be a problem on this scheme and it was decided that a policy of subdivision of holdings should be applied to enable individual tenants to tackle their own bush. There was a concerted drive on the building of cattle sheds, soil conservation and manuring as prerequisites of efficient farming. A severe infestation of tsetse fly in the Trans Thwaka area coincided with the vigorous regeneration of bush in this area.

Coast Province

Gede Settlement Scheme.—The total number of plots actually occupied increased during the year by 21 to a total of 520. This scheme will in future be administered as part of the normal district extension duties of departmental staff.

Shimba Hills.—There are 151 settlers with a further 25 due to come in. The settlement is now well established and the farmers are following their crop rotations and some are making use of phosphates. There has been a general improvement in both production and marketing and the settlers themselves are more contented.

Rift Valley Province

Riwa Grazing Scheme.—This has been in operation for four years and is an undoubted success. Grazing fees are being levied and will make the scheme eventually self-supporting. The graziers themselves now regard their pastures with pride and are not prepared to allow nomadic graziers to come in and destroy their grazing.

Esageri Ranching Area.—The grass recovery on this scheme is most satisfactory, and at the request of the people, the original scheme has been split into two units of approximately 15,000 acres each. One unit has 90 graziers with 900 head of cattle and the other 119 graziers with 1,700 head, the difference in stocking rates indicating the difference in the grass cover.

Perkerra Catchment Area.—This area has been examined by local staff and two new ranches of 20,000 acres each will be started on the four block system in 1959. Two hafirs were constructed in the Radad area during the year.

Lembus Forest.—The local inhabitants who have lived in the forest over the last 20 to 30 years are being resettled on demarcated holdings. 13,000 acres have been surveyed for the demarcation of holdings to accommodate 841 farmers.

Sarora Settlement.—A total of 206 settlers has been installed. Work hitherto has been concentrated on fencing, house building and cattle *boma* construction. Attention is now to be devoted to an improvement in farming methods.

Kaimosi Setlement.—The settlement of all the holdings will be completed in 1959. Tea planting by some 30 settlers is scheduled to commence in 1959.

Soil and Water Conservation

The Senior Soil Conservation Engineer's headquarters continued to function on the lines indicated in previous reports. Advisory work covered a whole range of technical problems including soil conservation, area planning, minor irrigation, field drainage and dam construction. On 1st July the "Agron" Workshops ceased to be a departmental responsibility and was taken over by the Ministry with a view to providing a service for all departments within the Ministry.

SOIL CONSERVATION—EUROPEAN AREAS

Terracing.—Comparative figures of work done are set out below and further details are given in Table E.

ACREAGES PROTECTED BY SOIL CONSERVATION MEASURES

DISTRICT	1941–55	1956	1957	1958	Total
Trans Nzoia	49,413	9,412	4,426	2,465	65,716
Uasin Gishu	48,655	8,355	12,734	16,272*	86,016
Nakuru	57,436	5,800	7,095	2,027	72,358
Thomson's Falls ..	35,775	8,213	10,764	4,869	59,621
S. Kinangop	6,984	4,922	6,562	5,656	24,124
Nyanza	8,574	579	1,079	979	11,211
Nairobi	4,990	439	501	684	6,614
TOTAL ..	211,827	37,720	43,161	32,952	325,660

* Includes 12,500 acres cut-offs in Elgeyo and Nandi.

Permanent Crops.—Work on tea, coffee and sisal estates in the Nyanza and Nairobi areas continued. The acreage known to be protected by suitable soil conservation measures is shown below:—

SOIL CONSERVATION IN PERMANENT CROPS (ACRES)

CROP	1941–55	1956	1957	1958	Total
Sisal	8,211	1,675	850	1,583	12,319
Wattle	4,556	—	—	—	4,556
Tea	4,320	355	362	741	5,778
Coffee	1,339	188	159	599	2,285
New Zealand Flax ..	999	—	—	—	999
TOTAL ACRES ..	19,425	2,218	1,371	2,923	25,937

Farm Planning.—There is a continued heavy demand for this service. Particulars of the work done are given below:—

FARM PLANNING, 1958

DISTRICT	Farms Surveyed and Mapped		Farms Planned		Total Planned 1951–58
	No.	*Acres*	*No.*	*Acres*	
Nakuru	18	15,533	24	22,617	81,869
Uasin Gishu	10	12,568	12	13,175	55,399
Trans Nzoia	7	6,500	6	5,838	24,979
Thomson's Falls ..	8	15,357	8	15,651	32,301
S. Kinangop	10	7,900	—	—	—
Nyanza	5	4,643	—	—	6,345
Nairobi	1	282	—	—	11,373
TOTAL ..	59	62,783	50	57,281	212,266

TABLE E—SOIL CONSERVATION SERVICE (EUROPEAN FARMING AREAS)

Output of Terracing, etc., for the year 1958

DISTRICT	No. of Farms Treated by Tractor	ACREAGE PROTECTED BY				Total
		Broad Base and V Terraces	Diversion Ditches	Narrow Base Terraces	Bench Terraces	
Trans Nzoia ..	44	1,095	1,370	—	—	2,465
Uasin Gishu ..	94	2,287	13,985*	—	—	16,272
Nakuru	29	933	1,094	—	—	2,027
Thomson's Falls ..	23	—	4,854	—	15	4,869
S. Kinangop ..	49	84	5,130	441†	1	5,656
Lumbwa	21	881	98	—	—	979
Nairobi	8	448	4	225	7	684
TOTAL ..	268	5,728	26,535	666	23	32,952

* Includes 12,500 acres in Elgeyo and Nandi District.

† Ridge and furrow for drainage.

COMPLEMENTARY WORKS

DISTRICT	Roads *yd.*	Excavation *cu. yd.*	Training Banks *yd.*	Outlet Drains *yd.*	Cut-off Drains *yd.*	Small Dams *cu. yd.*
Trans Nzoia ..	37,789	9,215	4,200	53,695	36,722	65,000
Uasin Gishu ..	209,160	144,300	1,950	30,577	30,080	150,800
Nakuru	32,185	—	2,560	23,835	30,875	77,500
Thomson's Falls ..	33,346	15,668	134	2,863	43,651	57,923
S. Kinangop ..	38,300	17,200	10,000	25,400	—	—
Lumbwa	21,452	18,175	55	9,147	4,266	—
Nairobi	25,020	13,830	834	2,134	3,943	—
TOTAL ..	397,252	218,388	19,733	147,651	149,537	351,223

Land Preservation Orders.—The Director of Agriculture issued 29 Orders under the Agriculture Ordinance in 1958, of which 24 were removals of orders from the register and the rest required protection works or the closure of eroded land. River Scouts operating in the Nairobi District laid out 326 miles of narrow-base terraces covering 2,050 acres in African cultivations on European estates.

SOIL CONSERVATION—AFRICAN AREAS

Nyanza Province.—Throughout the Province soil conservation work by communal labour is rapidly becoming a thing of the past, grass strips, trash lines and terraces being put in by the individual cultivator. In most areas this has become automatic when cultivating and the overall position in the Province is reasonably satisfactory. Enclosure is itself a valuable aid in soil control in that hedges become live wash-stops. Cattle continue to cause erosion both in the hill and lakeshore areas. Soil conservation drives in the dry season at the beginning of the year were hampered by a large proportion of the male population leaving their districts for work to raise money for taxes and school fees.

Rift Valley Province.—The semi-arid areas of the Province are being reconditioned by the installation of grazing schemes on an increasing scale. In the West Suk and Baringo Districts the total area under control now covers 388,000 acres. Initial opposition is now giving place to an appreciation by the local populace of the value of a rational system of grazing management. During the year approximately 20,000 acres have been protected by a skeleton layout of cut-off ditches in Elgeyo and Nandi Districts. Elsewhere in the Province narrow-base terraces are constructed as a routine on the arable lands. In Baringo and Elgeyo 28,000 tree seedlings were purchased by local farmers.

Central Province.—While the situation generally in the Province is reasonably satisfactory many of the farms on the steeper slopes which were in areas closed to cultivation have had to be opened up because of land consolidation, the owners having no alternative land to cultivate. Erosion is being contained in these areas by bench terracing and the careful laying out of hedges on the contour between fields.

Southern Province.—There have been further major advances in soil conservation during 1958. It is calculated that in the first year of the voluntary self-help (Mwethya) system in Kitui 110,000 acres were protected by terraces. In Machakos 2,395 acres were protected by terraces and 5,816 acres by bench terraces. 21,570 acres of land were scratch-ploughed during the year, of which 11,000 acres were planted to grass and 20,000 acres were cleared of bush.

Coast Province.—Over 23,000 acres were protected by means of contours, trash-lines and live washstops. In Kilifi the people are at last coming round to the idea that there is no need to disturb the trash-line annually but, once formed, it is better left to form an uncultivated filter strip.

Water Conservation—Mechanical Dam Construction Units

The work done by the mechanical units is detailed in the table below:—

Dam Construction, 1958

Unit	No. of Dams and Water-holes	Earth Moved	Water Storage	Cost per Cubic Yd.	Tractor Hours Worked	Mean Output per Tractor Hour
		cu. yd.	*mil. gal.*	*Sh.*		*cu. yd.*
Heavy—						
D.C.U.	1	166,930	102·5	1·40	12,784	27·46
	Other Work	184,139	—	1·41		
S.C.S. Units—						
Eldoret	25	150,800	22·0	—	1,502	100·00
Thomson's Falls	14	57,923	52·45	—	2,122	27·29
Kitale	11	65,000	45·0	—	1,970	33·00
Nakuru	18	77,500	33·25	—	2,085	37·17
Ruiru	—	—	—	—	—	—
Lumbwa . .	—	—	—	—	—	—
S. Kinangop . .	—	—	—	—	—	—
Total . .	69	702,292	255·20	—	20,463	55·98

Nos. 1 and 2 Dam Construction Units have now been amalgamated into a single unit. The work undertaken during the year included the Kiu Dam in the Ruiru area, canal construction on the Hola Irrigation Scheme and the commencement of the Kitui Township Water Supply Dam.

Water Supplies—African Areas

The work done in the Provinces is outlined below:—

Southern Province.—Eighteen sub-surface dams were given extra height and 39 new dams constructed bringing the total to 82 since 1955. 49 earth dams were constructed, mainly in Kitui District. Two rock catchment dams were completed in Kitui. One pipeline was completed in the eastern area of Kitui and work continues on two other pipeline schemes.

Coast Province.—In Kilifi District the A.D.C. construction unit repaired one dam and was still working on the construction of a new dam at the end of the year.

Nyanza Province.—The maintenance of dams in all districts improved considerably during the year. In Elgon Nyanza the bunding of small streams by local effort was introduced with considerable success, 150 miniature dams being built. In Kericho District the building of small demonstration weirs in seasonal streams has opened the eyes of the Kipsigis to the potential of this form of water supply and storage and a number of farmers in the Belgut area have now started to build their own. The building of roof catchments, especially in Kericho District, continued.

Central Province.—The improvement of water supplies by means of boreholes and the construction of furrows, pipelines and dams continued. In Nyeri District the drill rig was used to construct 35 successful boreholes.

Rift Valley Province.—In West Suk and Baringo 22 hafirs and dams were constructed. In Nandi five pump supplies were installed and 191 farms received individual water supplies from pipe schemes in addition to 49 wells dug on individual farms and the protection of numerous springs. In the Elgeyo District three large reticulation schemes, at Sergoit, Kilimá and Iten, have been installed. Pipelines have been extended in Baringo District and many springs protected.

Field Drainage

Ridge and furrow continues to give fairly satisfactory results in the Kinangop and Thomson's Falls areas. Trials are being conducted on the Kinangop with a combination of tile and ridge-and-furrow drainage. In the Londiani area mole draining has proved very successful, enhancing crop yields and creating an increased demand for this type of drainage. The demand for the construction of camber beds in vleis in the Nairobi District continued and 200 acres were surveyed and planned for this work. Unusually wet conditions, however, have delayed actual construction which must be carried out when the soil is dry for optimum results in the difficult clays of this area.

Irrigation

Irrigation Development Projects

The General Manager, Irrigation Development Projects, reports as follows:—

Perkerra Irrigation Scheme

Development.—1,477 acres have now been levelled, of which 1,195 acres have been fully completed with the necessary drops and field inlets, and are ready for irrigation.

The rate of development is still somewhat on the low side, but it has been hampered by unseasonable rains, the breakdown of machinery on several occasions and the difficulty of some of the terrain encountered. Also, on

remeasuring some areas previously developed it was again found that the original maps were incorrect in that they showed figures for areas in excess of the real figures. There was also a period of experimentation before the change over to the new form of layout was finally decided upon.

Altogether 385 acres were levelled during the year, of which 343 acres were fully completed.

In May, on the advice of the Chief Hydraulic Engineer, Ministry of Works, it was decided to experiment with the "border strip" method of irrigation layout and this has proved so successful that it has now superseded the previous method of "level basins". From an administrative point of view the new system is certainly more convenient and seems more easily workable and it should also result in a considerable saving of water.

There are still some 450 acres which were developed in the earliest days of the scheme which require relevelling and redesigning as they have proved difficult to water and have insufficient roads of access. It is proposed to start work on this area during the coming season.

Settlement.—There are now 241 tenants settled on the land. These tenants have proved a great disappointment and at the moment it would appear that they are not really interested in the scheme. They worked reasonably well on their first crop of maize, but have failed completely to produce a second crop of beans and groundnuts. They have shown a passive resistance towards growing any second crop at all. It is thought that this is due to the fact that they had a good maize crop and considered this one crop to be sufficient for their needs for the whole year. Also this year, for the first time, they are having to pay a small water rate and this they resent as it appears they wish to have everything free. In view of this present attitude, it has been decided not to take on any more tenants next year, even if there were more applications, which is unlikely, but to concentrate on what remains of the present intake and to try and teach them to realize what is meant by tenant farming. If at the end of this further year's trial they still appear unwilling to co-operate, Government will have to consider the possibility of allowing other tribes to settle on this scheme. It is a great pity to see good land, prepared for irrigation at considerable cost, not used to the full extent of its capabilities merely because local tribes are idle and unco-operative.

Crops.—The main crop has again been maize which probably averaged 12-15 bags per acre although the tenants only admitted to five-six, which is completely unacceptable.

Tomatoes grown on $\frac{1}{4}$-acre plots by the tenants made a good start, but deteriorated rapidly after rain, finally proving a failure due to blight. Beans and groundnuts should do well, but require more attention and better cultivation than the tenants are prepared to give at present. Hibiscus grows fairly well, but the retting is a laborious and unpopular task and it is doubtful whether the yields obtained would ever make this crop an economic proposition. The American Dwarf Hybrid Castor has also been tried experimentally in the field and shows promise. Harvesting is now in progress.

General.—A most disappointing year. Everything possible has been done to help these tenants but there has been no response on their part. It has been possible to cut down the hired labour force by half as most of the land preparation work is now done by machinery and there are now only about 340 Kikuyu hired labour remaining on the scheme.

MWEA-TEBERE IRRIGATION SCHEME

Development.—On the Tebere "A" black soil area 1,725 acres have now been levelled, of which 1,400 are now ready for irrigation and on the Nguka Swamp the corresponding figures are 365 acres and 349 acres, respectively. On the red soils on Tebere "A" 903 acres have been levelled, of which 252 acres have been completed ready for irrigation. During the year, however, red soil preparation was discontinued owing to watering difficulties and lack of suitable economic crop and all development was concentrated on the black soils.

The land preparation was carried out by settlers and labour on piece rates and feeder channels and drains were dug by detainees. As the number of detainees ran down and eventually ceased their place was taken by labour on piece rates whilst settlers continued on land preparation. All land preparation has been carried out under the direction of the Hydraulic Branch (M.O.W.).

The contract for the new headworks on the Thiba River to supply water for the proposed Mwea extension has been awarded and work will commence soon and is expected to be completed before the Long Rains start. Village construction has gone ahead and a further 312 double houses were completed during the year bringing the total up to 1,042 double houses and 183 single houses. Various shops and community halls were also constructed. Construction cost of the settlers' houses have been reduced from £50 to approximately £30 per house.

Settlement.—There are now 372 tenants settled on the land each with a full four-acre holding. This leaves a balance of 577 settlers still to be given tenancies during the coming year. There are 851 women and 1,905 children, all being settlers' families. Tenants have worked well and after the good rice crop in the Short Rains of 1957 and again in 1958 the demand for tenancies is considerable.

Crops.—The rice crop harvested in early 1958 from 565 acres gave an average yield of 22 bags (160 lb. each) per acre. It is probable, however, that the real yield was greater than this as some of the earlier made "acre fields" have turned out to be less than one acre.

The Long Rains 1958 crop from 437 acres suffered from physiological factors probably water and air temperatures combined with lack of sunshine at flowering, resulting in large numbers of empty heads and a yield of only nine bags per acre.

The present Short Rains crop looks like being an excellent one and early yields are averaging nearly 30 bags to the acre.

Quelea (Sudan Dioch) have again been active, but prompt action on the part of the Bird Control Officer again saved the crops. One aerial spray and one "blow up" were carried out at Nguka with excellent results, but little can be done at Tebere "A" as the roosts are thinly spread in swamp reeds along the Nyamindi River.

Experiments have been carried out with Tilapia breeding in the hopes of it being an economic crop to rotate with rice. It is still too soon to know whether it will be a success, but early results seem promising.

Trials of other crops have continued on the irrigable portion of the red soils. Tomatoes have done well and in spite of boll-worm and disease and loss from labour shortage during the *K.K.M.* sweep, averaged nearly eight tons per acre. A further area has now been sown. Hibiscus has again proved uneconomic, the

highest yield per acre being 630 lb. of fibre from the Cuban variety. Here again a further acreage is being tried. Other crops tried included sunflower (1,198 lb. per acre); onions (1,098 lb. per acre); garlic (325 lb. per acre); and velvet bean (373 lb. per acre). In addition a quantity of grapefruit has now been planted out and an area of chillies is growing well.

General.—The year has been one of steady progress and the rate of field preparation has increased considerably. Morale amongst settlers, tenants and labour is much higher than ever before.

Now that rice growing has been proved a success and the whole area is to be planted to rice only during the short rains, some considerable reorganization and capital expenditure will be required on crop handling and tenants' accounting and at a future date on crop marketing.

Hola Irrigation Scheme

Development.—The first four months of the year were occupied in preparing the first 400 acres of the pilot area. Owing to excellent work on the part of all concerned, in spite of many difficulties, water arrived at the head regulator of this pilot area on 20th April. Since then work has continued without pause on preparing the rest of the pilot area to bring it up to 800 acres by March, 1959. By the end of the year about 80 per cent of this work had been completed.

A further area has also been opened up about one mile to the north of the pilot area. 100-ft. traces were cut at intervals of 1,000 ft. in a grid pattern and by the end of the year 1,500 acres had been opened up in this fashion involving the clearing of about 400 acres of bush. This area is now ready for survey and it is proposed to choose a further 400 acres in this area for development, bringing the total area up to 1,200 acres developed by the end of June, 1959.

Settlement.—During August the first village was built consisting of temporary huts ("A" Frames) and selected detainees move there to become the first tenants. Their holdings were allotted to them in October and there are now 121 tenants settled on the land. On 11th October the first families arrived and village life was organized. It is intended to settle a further 100 tenants on the land very soon now. During November and December a start had been made with another tenants' village and also with a labour village.

The tenants are working excellently and show marked enthusiasm and great interest in their work.

Crops.—In the Long Rains on the pilot area maize (90 acres), cotton (180 acres), groundnuts (60 acres), and soya beans (30 acres) were planted. Maize was a fair crop and gave eight bags to the acre. Cotton was unfortunately late in sowing and as a result water had to be cut off earlier than was desirable in order to harvest before the rains. The yield of 630 lb. of seed cotton per acre was disappointing but not discouraging. Soya gave 400 lb. of beans to the acre and groundnuts 735 lb. unshelled; a poor result, but only to be expected after the bad germination.

In the Short Rains season the tenants have planted maize (100 acres) and soya beans (300 acres).

Work on the experimental area continues. It is apparent that a period of leaching, even of short duration, gives good results, but the most effective treatment would appear to be green manuring. A lot of work has been done on

fibres, including jute, hibiscus and *Urena lobata*. Jute appears to grow here and produces a good quality fibre, but yields and length of fibre are not yet adequate to consider it as an economic proposition. Most work has been done on cotton and three types of Egyptian cotton have been tried with encouraging results, the great disadvantage being the longer maturing period.

Stalk borer was apparent on the maize crop, but was controlled by spraying. On the cotton American boll-worm and stainers did a fair amount of damage. It will be a costly business to maintain the necessary spray regime for this crop.

General.—Considerable progress has been made during the year in spite of the usual frustrations and delays.

Originally the pilot area was intended to be a large-scale experiment into the economics of this irrigation scheme, but political necessity has forced a faster pace and we are going on to the next stage of development without having had the time to make a complete assessment of the knowledge gathered so far. This same political necessity has naturally also increased the cost of the scheme especially in its earlier stages as it was necessary to bring in contractors in order to keep to the very tight time-schedule.

Agricultural Education

The Training of Agricultural Instructors

Particulars of the instructors in training at the centres at the end of the year are given below:—

Two-year Course

Province	*First year*	*Second year*	*Total*
Nyanza (Siriba)	25	26	51
Central (Embu)	7	7	14
Coast (Matuga)	19	28	47
Rift Valley (Kapenguria) ..	—	18	18
	51	79	130

Four of the 26 instructors in their second year at Siriba are women. Only School Certificate level students were accepted at Siriba for the first-year intake. Of these five had actually passed School Certificate and quite a few of the remainder will re-sit the examination in 1959. At Embu all the students remaining at the school are of School Certificate standard. Refresher courses for departmental staff and farmers were organized at Embu, Kaimosi and Matuga.

Farm Institutes.—Good progress has been made in the building up of the centres at Bukura and Kabianga to accommodate, respectively, courses of 100 and 50 students at a time. It is planned to open both centres early in 1959 and provide short courses for large numbers of African farmers. In the Central Province development of the Waruhiu Memorial Institute at Kikuyu made good progress. Courses were held at the Nkubu centre in Meru District, at Kianyagga in Embu District and Wambugu in Nyeri District. The Wambugu centre has become increasingly popular and has played a notable part in the follow-up in Nyeri District after land consolidation. Nearly every student has carried the lessons learnt back to his holding for practical application.

School Gardens.—In Nyanza Province concentration upon school garden development continued to be an important part of departmental activities. However, the general standard of enthusiasm exhibited by teaching staff has not been great. In the Coast Province the standard of school gardens has slightly improved and in Kilifi plans have been issued to each school showing the layout and rotation. In all districts of the Rift Valley Province school gardens have been visited and assisted.

Young Farmers' Clubs and Better Farming Societies.—In the European areas the Young Farmers' Club movement is gaining interest. In the African areas these clubs have made most progress in the Coast Province, where their number has increased to ten. The total membership is 302, one club in Kilifi District has 27 members. A club at Gem in Central Nyanza is now buying seeds for distribution amongst members.

Numerous Farmers' Days were held at departmental farms and research centres during the year and close co-operation was maintained with the Royal Agricultural Society of Kenya, the Kenya National Farmers' Union and the various statutory Boards in staging these and other farm and estate demonstrations.

Agricultural Shows

In addition to the programme of shows staged by the Royal Agricultural Society of Kenya, at which the Department staged exhibits, some very successful district shows were held, notably in North Nyanza, Nandi, West Suk and Kiambu.

Marketing

Produce Marketing and Inspection

Details of the quantities and value of produce that passed through the markets in 1958 are given in Table D. The position in the African areas during the year was as follows:—

Nyanza Province.—The Nyanza Province Marketing Board continued to be responsible for the marketing of all African-grown crops, with the exception of coffee, tea, pyrethrum, wattle bark and vegetables and fruit. The Board engaged in trading activities on its own account, buying and selling cash crops valued at over £200,000, with satisfactory results in spite of falling values. Efforts were continued by the Board to induce producers and traders to disinfect their crops before arrival at their storage, and sales of 4,424 one-pound packets and 8,422 six-ounce packets of proprietary insecticides were made. The co-operation of the African producer has been actively sought by the Board by means of monthly bulletins and regular broadcasting.

Central Province.—The reorganization of marketing in the Province continued during the year with the emphasis on the co-ordination of procedure throughout all districts. The routine for maize and controlled produce marketing based on the procedure used in Nyanza was gradually brought into use necessitating changes in documentation and permits. The first exportable surplus of maize from Nyeri District for many years was delivered to Maize Control in October and November. Wattle bark sales continued at a reduced level due to the lack of mature stands. Pineapple marketing was the best ever, with the Gatundu division of Kiambu exporting over 1,700 tons in the month of April. Miraa (*Catha edulis*) from Meru District was carefully selected and exported to Aden, but the potato crop from that district suffered from blight and obtained a poor return to growers. Sales of dolichos beans (Njahi) more than doubled. Plums from Fort

Hall were sold in bulk to a cannery and to Nandi. Surplus food sales from the Kikuyu districts were hampered by moist conditions and inability of growers to dry their crops down to the required moisture content for marketing. It is expected that a Central Province Marketing Board will start to function in 1959.

Southern Province.—Inspection systems in this Province, which in the past have been haphazard, were improved by the assignment of a departmental officer to the work of general quality and marketing improvement. A start was made on grading and prepackaging in a small way, with satisfactory results and much time was spent on seeking outlets for produce. Large quantities of produce passed through Nairobi markets. In all districts plans are now under way to introduce certain minimum conditions for the issue of trader's licences.

Coast Province.—Both the cotton and cashew nut crops were inspected by departmental staff, the former being of an exceptionally high quality. Only Kwale and Taita Districts are able to afford a small inspection service for other crops. In the Taita District the service is essential for the inspection of the chillie and wattle bark output. Choice mangoes, grown in Malindi District, and carefully selected before despatch, were sent by air freight to Covent Garden. This trade has been very ably organized by departmental staff at Malindi, but efforts to launch the scheme as an independent co-operative enterprise have not so far succeeded.

Rift Valley Province.—The marketing of perishable produce from Elgeyo and Nandi received a set-back with the removal of the Marketing Officer from Eldoret during the year, owing to difficulties in finding his salary.

Co-operation

The societies in Nyanza Province continued to increase in number and require close guidance in the management of their affairs. Some of these societies and unions are handling fairly large turnovers as, for example, the Kisii Coffee Union which in 1958 coped with a crop worth £155,000 which must be regarded as a credit to those concerned. This is, of course, greatly exceeded by the Meru African Coffee Union in Central Province, which handled a crop worth over £512,000.

In the Coast Province Co-operative Societies have run into difficulties, financial in the case of the Taita Vegetable Co-operative, political in the case of Kilifi District, and lack of sufficient members in the case of the Shimba Hills Co-operative. However, the Coffee Co-operative in the Taita Hills is well established and successful.

Grading and Inspection Services, Mombasa

Inspection.—The number of packages of plants and plant products imported and inspected at Mombasa fell to 512,447 in 1958 compared with 1,713,198 in 1957. The 1958 figures exclude two shipments of Argentine wheat totalling 197,800 bags which were inspected in bulk. The value of imports rose slightly to £2,210,190.

Imports of fresh fruit were approximately the same as in 1957, although there was a marked increase in Australian apples, balanced by a fall in Italian apples. Imports of plums, pears, peaches, etc., from South Africa were a new feature. Imports of grapes showed a slight increase.

Imports of onions from Egypt and the Lebanon were maintained at a high level.

Forty infestations of *Trogoderma granarium* were detected during the year, of which 33 occurred in mixed cargoes of foods and spices from India. None was found in imports of malt. Two were found in consignments arriving by *dhow* from Dar es Salaam, one of rice and one of starch. All infestations were fumigated.

Grading.—Maize exports increased considerably during the year and grading continued throughout the year. Japan was a major customer and other shipments were to various European ports. Quantities graded are shown in the table below. The total number of shipments completed during the year was 14. All maize exported was fumigated with methyl bromide either by Maize Control or commercial firms. Departmental staff carried out post-fumigation inspections and some difficulty was experienced with the reinfestation of stocks after fumigation. In one consignment live insects were observed after the fourth fumigation in a period of two weeks. The problem is under investigation. Small shipments of ungraded maize were made to the Seychelles.

There was a great increase in the number of bags of beans of all varieties shipped to 54,298 bags in 1958 (11,117 in 1957), mainly as a result of the release by Produce Control of large stocks of Canadian Wonder and Rose Coco beans towards the end of the year.

The quantity of potatoes exported increased, all being of Kenya origin mainly from Elburgon and Nanyuki.

PRODUCE GRADED FOR EXPORT (BAGS), 1958

	Maize	Wheat	Beans	Potatoes
				Cwt.
K.1	—	949	—	—
K.2	—	972	999	63,228
K.3	—	—	26,501	—
K.4	1,100,970	136	15,732	—
K.5	—	18	200	—
K.6	—	158	10,771	—
R.J	13,171	—	95	1,842
Total 1958	1,114,141	2,233	54,298	65,070
Total 1957	254,264	3,034	11,117	49,888

Figures for chillies graded are as follows:—

CHILLIES GRADED FOR EXPORT (BAGS), 1958

	Capsicum Minimum	Capsicum Annuum	Total
G.A.Q.	186	—	186
F.A.Q.	538	15,748	16,286
Undergrade..	4,800	8,209	13,009
Reject	—	126	126
Total 1958	5,524	24,083	29,607
Total 1957	6,792	22,011	28,803

Fumigation and Conditioning.—Demolition of the Grain Conditioning Plant began on 27th February, and a final certificate of satisfactory clearance was issued on 28th August, 1958.

Entomology.—An Entomologist (Stored Products) was posted to the Grading and Inspection Division at Mombasa in August.

Revenue.—This increased from Sh. 42,983/50 in 1957 to Sh. 121,513/32 in 1958.

Quelea Control

Breeding Colony Control

In close co-operation with Tanganyika large-scale Quelea breeding colony control was carried out for the first six months of the year. A total of some 2,610 acres of dense breeding colonies were dealt with, using flame-throwers, destroying an estimated 60,500,000 young birds. 760 acres of these colonies were located in Kenya, the balance being found from some 80 miles south of Dodoma to the Northern Province of Tanganyika in the Tanganyika Rift. It was subsequently apparent from field observations that this colony campaign had accounted for a very large proportion of the year's breeding, more especially as no invasion occurred in the Northern Province of Tanganyika where, in past years, the majority of Quelea attacking crops have proved to have been "birds of the year".

However, the adult birds, which are not destroyed in these operations, frustrated by control in their breeding attempts, entered the Kenya wheat areas nearly two months earlier than usual. These birds retained full breeding condition and were found constructing nests near most of their roost sites and, in fact, three small colonies with very dense nest and high egg counts were destroyed in reeds during the crop campaign.

Roost Control in Agricultural Areas

Severe invasions commenced entering the Lower Rift Valley wheatlands in early July, and a full-scale control was necessary until mid-December to save large-scale losses in most areas.

During the first two months of the invasion, some very large concentrations were quickly located and dealt with, and thereafter smaller roosts, often in very difficult sites in reeds over deep water, had to be contended with. In all, eight aerial night spraying operations using a formulation of Parathion and 26 blow-ups of various sizes took place, destroying an estimated 6,552,000 birds. Of these operations, one aerial spray and one blow-up were carried out on the Mwea-Tebere Rice Scheme, and one blow-up was necessary near Gazi on the South Coast, where several hundreds of acres of sorghum were being destroyed. The balance of control took place in the Rift Valley wheatlands, including four blow-ups in the Uasin Gishu. Estimated direct savings to these areas amount to 125,000 bags of small grains.

Biological research on Quelea continues together with the search for better and more economical control methods.

PART IV—GENERAL

Library

A small increase in the vote made it possible to provide more books for provincial headquarters and district libraries and further additions were also made to research station libraries. The following journals were added to those already taken by the Department: *The Ceylon Coconut Quarterly, The Indian Coconut Journal. The Canadian Journals of Plant Science and Soil Science, The Indian Journal of Agronomy*. Four issues of the Newsletter appeared during the year. During the year a new scheme of leaflets for sale and free issue to farmers got under way, resulting in an unexpected volume of work after publication of a notice in the *K.I.O. Fortnightly* of the leaflets available.

Publications

The following is a list of articles, bulletins, etc., by departmental officers published during the year:—

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———— Growing tomatoes for profit. *Ibid*, No. 11, p. 40.

———— Melons and cucumbers. *Ibid*, Vol. 3, No. 1, p. 24.

———— A ready local market for Garlic. *Ibid.*, Vol. 3, No. 2, p. 24.

———— Root crops. *Ibid.*, Vol. 3, No. 3, p. 14.

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Bullock, J. A.—Barley fly, black wheat beetle and maize stalk borer. *The Kenya Farmer*, April, 1958. p. 25.

———— Thrips and red spider mite on pyrethrum. *The Kenya Farmer*, June 1958, p. 23.

Crowe, T. J.—E.C.G.C. Progress Reports from Experiment Stations (Kenya 1956/57). (Entomology Sec.).

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Golding, T. R.—Coffee in Embu. *Coffee Board Bulletin, 23,* 183.

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———— Protection of bagged maize with lindane and D.D.T. *Trop. Agric. (Trin.),* 35, 292.

Guthrie, E. J., and Robinson, R. A.—Barley leaf diseases. *The Kenya Farmer,* December, 1958, p. 21.

Hepper, C. M.—Why not be your own nurseryman? *E.A. Farmer and Planter,* November, 1958, p. 27.

Jackson, T. H.—The home orchard: part 2. *E.A. Farmer and Planter,* Vol. 2, No. 4, p. 25. Part 3, No. 5, p. 25. Part 4, No. 6, p. 27. Part 5, No. 7, p. 29. Part 6, No. 8, p. 27. Part 7, No. 9, p. 49.

Jackson, T. H., Bennison, R. H., Evans, H. R., and Bannister, T. H.—Notes on Kenya agriculture. IV—Fruit and vegetables. *E. Afr. agric. J., 24,* 79.

Jones, P. A., and Robinson, J. B. D.—Notes on a tour of Nyanza coffee districts. *Coffee Board Bulletin, 23,* 92.

Kockum, S.—Control of insects attacking maize on the cob in maize stores. *E. Afr. agric. J., 23,* 275.

Kroll, U.—The breeding of improved pyrethrum varieties. *Pyrethrum Post,* Vol. 4, No. 4.

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———— Some new pyrethrum varieties. *The Kenya Farmer,* November, 1958, p. 22.

———— Some plant breeding aspects on pyrethrum. Paper read at Specialist Committee on Agricultural Botany, Njoro, September.

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Strange, R.—Pasture plants (six parts). *The Kenya Farmer,* January-June, 1958.

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Legislation

The more important legislative measures enacted during the year were:—

1. *The Dairy Industry Ordinance* (*No.* 34 *of* 1958). This Ordinance results from the Report of the Committee of Enquiry into the Dairy Industry on which the Government published its views in Sessional Paper No. 9 of 1956/57. Its object is to establish a Kenya Dairy Board with all such powers as may be required to regulate the production and marketing of dairy produce and to improve the efficiency of the industry and the quality of its products. *Part II* of the Ordinance establishes the Board as a body corporate, details its membership and the meetings of the Board. *Part III* covers its functions, powers and duties. These legislative powers include the registration and licensing of distributors and retailers and their premises, power to call for returns, to prescribe the duties of inspectors, to prescribe minimum standards, to fix prices, to impose levies or cesses, to pool produce and to direct it to appropriate areas. *Section* 23 enables the Governor in Council of Ministers to empower the Board to acquire dairy produce by means of compulsory purchase. *Part IV* of the Ordinance contains financial provision dealing with the accounts of the Board, its powers of investment and borrowing, and the audit of the accounts. *Part V* relates to the registration of primary producers, and *Part VI* covers offences and appeals.

NOTE.—*Part V* of the Ordinance came into operation in the Scheduled Areas, and the rest of the Ordinance in respect of dairy produce produced in the Non-Scheduled Areas and sold or intended for sale in the Scheduled Areas or in certain designated municipalities and townships, on 16th December, 1958. Regulations covering returns, reports and estimates were published on the same date.

2. *The Fencing Ordinance* (*No.* 31 *of* 1958). The Fencing Ordinance was enacted in 1929 but was never brought into force, principally because its operation would have involved public authorities in excessive expenditure for the fencing of Crown Land, railway and road reserves, African reserves and other land areas. This Ordinance, in replacing the existing Ordinance, differs widely from it, and does not apply to land held or occupied by the Crown (including Government departments), forest areas, roads and railways, but relates exclusively to farms and agricultural holdings. *Section* 3 enables an occupier to call upon his neighbour to join in the cost and arrangements of fencing their common boundary; provision is made for objections and for dispute, if any, to be decided by the local Agricultural Committee (*Section* 5). Subsequent clauses cover the sharing of costs in various circumstances, including maintenance, and liabilities. *Section* 24 enables the Minister to make rules and, *inter alia,* to prescribe permitted types of fences.

3. *The Canning Crops* (*Pineapples*) *Rules*, 1958. The rules are designed to regulate the growing of pineapples for canning and the canned product, grades for raw pineapples, inspectors' powers, and requirements for different forms of canned pineapple products are laid down, and the licences and fees required.

4. *The Crop Production and Livestock* (*Livestock and Controlled Areas*) *Rules*, 1958, orders the appointment of a committee in any district to which the Rules apply and defines their powers in regard to branding and culling, declaring controlled areas and the like. In the Schedule the Rules are applied to the Baringo District.

5. *The Land Development Loans (Short-term Development) (Interest) Rules*, 1958, lay down an interest rate of 7 per cent for these loans and define the developments which class as short term. These are the purchase of livestock, machinery and equipment, land clearance, work to prevent soil erosion, farm planning done by the Department of Agriculture.

6. *Marketing of African Produce Ordinance*. Establishment of an African Sugar Marketing Board for Nyanza Province, and of a Tea Marketing Board for Nyanza and Rift Valley Provinces.

7. *Pig Industry*. The Quota of Pigs Rules were revoked.

8. *Suppression of Noxious Weeds Ordinance*. Declaration of *Salvinia Auriculata* as a noxious weed.

Staff

Three new Agricultural Officers arrived after completing their training in Trinidad—Messrs. G. B. Cliff, C. A. Jackson, and J. M. Suttie. Mr. R. V. Blandy arrived to fill an Agricultural Officer vacancy in the Horticultural Division, and Messrs. A. Davidson and F. Ashman joined the Entomological Services, and Mr. K. W. Lynch the Plant Breeding Services. Messrs. A. G. Banks and T. R. Golding were promoted Agricultural Officers (Kenya), and four officers were promoted to fill S.A.A.O. vacancies. As part of the general Government economy drive the total establishment of assistant agricultural officers was reduced from 267 to 240 by the end of the year. Under the American Aid (I.C.A.) programme Dr. J. Thorpe and Messrs. F. T. Miller and G. A. Woodruff, all soil specialists joined the Research Services.

A notable event during the year was the retirement of Dr. R. H. Le Pelley, who had been in charge of the Entomological Services for many years and first joined the Department in 1929. Another loss was the departure on retirement of Mr. C. F. M. Newton, who had been with the Soil Conservation Service since 1942.

Once again I thank all members of the Department for a year of good work and progress. Due to the recruitment ban, staff have been short and officers, research and field alike, have shouldered the additional burden of work most willingly. The Department was happy to congratulate Sir Stuart Gillett, a recent Director of Agriculture, on his well-earned knighthood.

Nairobi,
8th February, 1959.

R. J. M. SWYNNERTON,
Director of Agriculture.

G.P.K. 658—820—3/59